The
Geographical Journal.

No. 4. APRIL, 1899. Vol. XIII.

EXPLORATION IN THE CANADIAN ROCKIES: A SEARCH FOR MOUNT HOOKER AND MOUNT BROWN.*

By Prof. NORMAN COLLIE, F.R.S.

The history of the exploration of the Rocky mountains of Canada is one full of interest. It deals with the early struggles of the fur traders of the North-West Territory, later with the search after gold, and finally with the story of how a railway was built, almost regardless of expense, through the wild canyons of the West—a railway that for hundreds of miles passes through thickly wooded valleys, over lofty mountain passes, across raging torrents hundreds of feet below, till finally it reaches the Pacific coast at Vancouver.

By far the fullest, most accurate, and interesting account of travel and observation amongst the Rocky mountains is that of Captain Palliser and his party, during the years 1857–60. This expedition was organized by the British Government in order that a route might be discovered between eastern and western Canada. Up till then only one pass over the Rocky mountains in Canadian territory was known with certainty, namely, the Athabasca; the Palliser expedition "was to ascertain whether one or more practicable passes existed over the Rocky mountains within British territory, and south of that known to exist between Mount Brown and Mount Hooker." During their explorations they discovered and laid down the following: the Kananaskis pass, the Vermilion pass, the British Kootanie pass, the Kicking Horse pass. All these passes traverse the watershed of the continent within British territory. Dr. Hector also traversed the Howse pass, between the head-waters of the Saskatchewan and the Columbia rivers.

* Read at the Royal Geographical Society, February 13, 1899. Map, p. 464.

Ten years later British Columbia entered the Dominion of Canada, and at once the Government survey for the Canadian Pacific railway was started. It was amongst the Rocky mountains that the difficulty of selecting a route was most evident. No less than eleven different ways across the mountains were surveyed, from the Peace river in the north to the Crow's Nest pass in the south. This survey alone is said to have cost between three and four million dollars; but finally the Canadian Pacific railway was opened in 1886, after nearly one hundred and fifty million dollars had been expended on its construction. The opening of the railroad of necessity largely stopped the use of the old passes, but at the same time enabled those who wished to travel in the mountains in search of game or amusement to do so with much greater facilities.

It is only, however, within the last few years that many sporting, exploring, or mountaineering expeditions have made use of these opportunities. Members of the Appalachian Club of Boston have spent several seasons amongst the peaks and glaciers near Glacier House, Laggan, and Field on the railway. Prof. Coleman undertook a journey from Morley to the sources of the Athabasca river, in order to search for the two peaks Brown and Hooker, of which little was known except that they had been discovered about sixty years previously, and were supposed to be 16,000 and 15,000 feet in height.

Mr. W. D. Wilcox,* in the mean time, had explored the mountainous country south of the Canadian Pacific railway, as far as Mount Assiniboine, and north to the Saskatchewan and Athabasca. His experiences have been published in a delightful book, 'Camping in the Canadian Rockies in 1896.' Most of our knowledge, therefore, at the present time, of that part of the mountains which lies 100 miles to the north or to the south of the railway at Laggan, is either knowledge gained in the early part of the century by traders in the employ of the fur-trading companies, or from Palliser's 'Journals,' or Wilcox's book on Mount Assiniboine and the surrounding country.

For the most part, these explorations have been restricted to the valleys and low passes; very few attempts have been made to locate or explore the great snow-fields and the surrounding peaks that form the great backbone of the country. To take the Alps as an example, it would be a parallel case if a few parties had started from Geneva, explored the St. Bernard pass, pushed up the Rhone valley over the Furka pass and the St. Gotthard, without much troubling themselves about either the snow-fields of the Oberland or the side valleys and great peaks on the main Pennine chain with their attendant glaciers. This paper deals with two journeys taken during 1897 and 1898 through that part of the Canadian Rockies that lie between the Kicking Horse pass on the south, and to the source of the Athabasca river on the north. At first,

* See p. 358.

in 1897, I did not intend to trouble myself with exploration—the expedition was merely to be a mountaineering one; but, soon finding that the maps, such as they were, covered only a very small portion of the ground I proposed to go through, and as no knowledge whatever of the snow-fields and peaks seemed to exist, it at once became obvious that exploration might very well be combined with the mountaineering.

At the beginning of August, in 1897, whilst on the summit of a snow-peak (Mount Gordon, 10,600 feet) that lay about 20 miles north of the railway at the continental divide, a high mountain was seen 30 miles away to the north-west. It seemed much higher than all its

FALLS OF THE BOW RIVER, BANFF.

neighbours, and we were of the opinion that it probably might be Mount Murchison. I had intended to go south and visit Mount Assiniboine and the country in the immediate vicinity, but the sight of this splendid mountain made me at once change my plans, and on returning to civilization at Banff a few days later, Mr. G. P. Baker and I determined to go north instead, in order to, if possible, get to the foot of this mountain, and afterwards, perhaps, should we be fortunate, to climb it as well.

We accordingly hired an "outfit" from T. Wilson, of Banff, who supplies men, horses, and provisions for such expeditions to the mountains. Although Wilson, years before, whilst working for the Canadian Pacific railway, had been in the country we wished to visit, yet he did not remember ever having seen a very high peak about the spot

where we thought we had seen one when on the summit of Mount Gordon. This, however, did not dishearten us much, for we knew from experience that it is only from the tops of mountains that any really accurate ideas could be obtained of the relative heights of surrounding peaks.

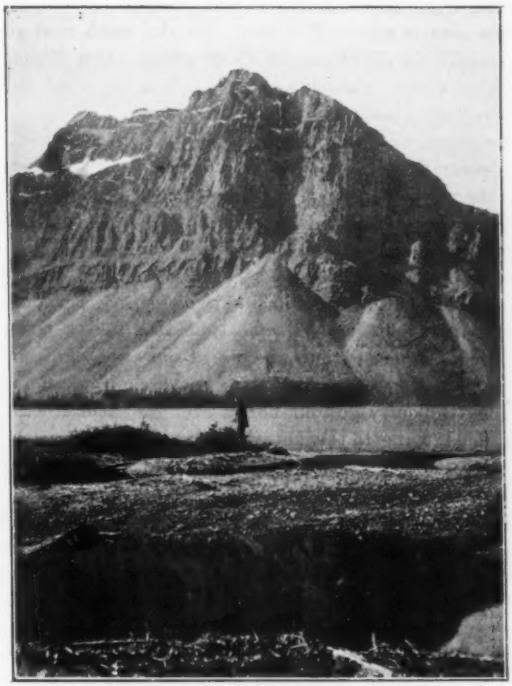
On August 17 we started from Laggan station up the Bow valley. The lower portion of the valley is rapidly becoming impassable owing to fallen trees; for the forest was burnt during the time that the Canadian Pacific railway was being built, and now after fifteen or more years the roots of the burnt firs have become thoroughly rotten; every fresh gale brings down large numbers of those still standing, adding

LAGGAN STATION AND MOUNT VICTORIA

to the almost inextricable tangle below. It is quite possible in this part to walk for more than a mile along the fallen stems, never being nearer than two feet, and sometimes finding one's self as much as ten or more feet, from the ground.

Our party consisted of G. P. Baker and myself, P. Sarbach (a Swiss guide), W. Peyto, L. Richardson, and C. Black, cook. The weather was excessively hot, and the mosquitoes swarmed in countless thousands, making life miserable. The horses, moreover, were heavily laden, so we travelled but slowly. It was not till the third day that we arrived at the head of the Bow valley, where a pass leads over into Bear creek or the Little fork of the Saskatchewan. This pass is similar to many in the Rocky mountains. The woods—that down in the valleys are

usually so thick that it is impossible to see far ahead, and, owing to fallen trees, make it most difficult to get the horses along—on the passes open out, and large open stretches of grass alternate with groves of pine trees that act as shelter for tents. Often small lakes are found as well, and the views of snow-clad peaks, glaciers, lakes, and forest make most beautiful pictures. The scenery at the head of the Bow valley surrounding the upper lake is grand, and will not disappoint any one who should make the journey there. The lake, also, is full of



THE UPPER BOW LAKE.

trout; some weighing as much as 30 lbs. have been caught. We stopped a day on the pass for two reasons: the horses needed a rest, and Baker wished to pick up his points in a plane-table survey that had been started by Mr. Herschel C. Parker, of Brooklyn, N.Y., during our trip a week before when we ascended Mount Gordon.

Mr. Parker took as his base-line the distance between two stations in the Bow valley that had been trigonometrically determined by the Canadian Government for their photographic survey. These two points were 6·365 miles apart. One south of Mount Hector, and marked on

the Government Survey sheet as station No. 1, 9830 feet; the other a peak lying on the opposite side of the valley, north of the Upper Bow lake, marked station No. 2, 9178 feet. When Mr. Parker returned to the States, he kindly handed over his map to Baker to continue it to the north. On August 20, Baker, Sarbach, and I ascended a rock and snow-peak south-west of the pass (9100 feet), from which a good view down both the Bow valley and Bear creek could be obtained, thus enabling Baker to add a large number of extra points to his map. A fine specimen of a trilobite was found on this summit.

The Bow pass is about 6700 feet. On the north-west side the trail descends steeply for 1000 feet to Bear creek, down which flows the Little Fork of the Saskatchewan river. This branch rises in a large glacier above Peyto lake.

Halfway down the valley two more lakes were passed, on which were seen several kinds of water-fowl, whilst on the eastern side of the valley the woods had only recently been burnt. The gaunt shining black stems of the trees formed a curious but fitting background for the mass of brilliant golden-yellow daisies that were in full bloom amongst the stones at their feet. And the ruined woodland, clothed in black velvet and gold, harmonized in its two dominant colours with the sapphire sky above; but at the same time the lifeless trees, without a vestige of green, gave a curious and weird aspect to the scene.

On August 23 we reached the main Saskatchewan, and on the next day with some difficulty got our horses over the Bear creek river, for it was in full flood owing to the hot weather and the immense amount of melting snow. The following day we climbed Mount Sarbach, 11,100 feet, the most northerly peak of the Waputehk range. Unfortunately, the clouds were low on the mountains, so we were unable to distinguish with certainty where the high peak we were in search of might be; but to the westward a splendid glacier was seen, winding down from a snow-covered range beyond. Away to the north-west lay Glacier lake, fed by the waters from a large snow-field, at whose head two peaks, one snow-covered and one black rock, rose into the drifting clouds. These peaks, we afterwards discovered, were probably the Mount Lyell of Hector.

On August 27 we arrived at the foot of the valley leading to the glaciers we had seen two days before from Mount Sarbach, towards the westward. Directly to the north of us was the peak we were in search of. Later on, consulting Palliser's 'Journals,' we found that this peak was not Mount Murchison, as we had supposed, but Mount Forbes, discovered by Dr. Hector, and estimated by him to be about 13,400 feet. Mount Forbes is certainly one of the highest peaks in the Canadian Rockies, and must be close on 14,000 feet. I have seen it on every side except the north-west, and it always towers as a huge three-sided pyramid at least 3000 feet above the surrounding peaks, which are from 10,000 to 11,000 feet high. The precipice on its eastern face is more

sheer than the western face of the Matterhorn, and even after a heavy snowfall remains black and forbidding. On its northern side the peak must stand about 7000 feet above the glacier at its base.

Up till this date the weather had been perfect, but on the 27th a change for the worse began, which rendered climbing on the high peaks impossible. However, whilst waiting for the snow to melt off the precipices and *arête* of Forbes, the valley and large glacier to the westward were explored. Hector seems to be the only person who had ever visited this glacier (Palliser's 'Journals,' p. 150).

AT THE HEAD OF THE FRESHFIELD GLACIER.

At the head of the glacier a large ice-field (Freshfield glacier) was traversed, and an attempt was made to climb the highest of these—Mount Freshfield, about 12,000 feet—but, owing to want of time, the party was unsuccessful.

From the highest point reached, 10,000 feet, a very lofty mountain—probably 14,000 to 15,000 feet—was seen lying 30 miles away in a north-westerly direction. Only two peaks north of Lyell are marked on the map, and these are Mount Brown and Mount Hooker, which are supposed to be 16,000 and 15,000 feet high respectively; consequently we at once took it for granted that we had seen one of them. On September 1 we made our only attempt to climb Mount Forbes, but did not succeed; the rain, snow, and wind driving us back wet through, after a most unpleasant night spent in the woods at the foot of the mountain. It was now time to think of returning to civilization; moreover, we had heard tales of

how, at the beginning of September before the Indian summer sets in heavy snowfalls often occur in the mountains, necessitating a halt till most of the snow melts. As none of us were desirous of spending the best part of a week snowed up in camp, we concluded that we had better make all haste for the north branch of the Kicking Horse river, and follow it down to Field station on the railway.

Accordingly, we pushed over the Howse pass into the Blaeberry creek. Soon all signs of a trail were lost; the forest, being on the western slopes of the mountains, became thicker, and great difficulty was experienced in getting the horses backwards and forwards over fallen timber and the stream that increased in size every mile down the narrow valley. At last we found the valley opening a little, and came to a trapper's deserted log cabin. A single man seemed to have inhabited it, and we wondered who it might be, that, for the sake of a few martin-skins, had lived there alone through a whole winter. A more desolate spot could hardly be found, hemmed in on all sides by gloomy mountains that during the winter months shut out the sun's rays, exposed to the full force of the south-west gales that would sweep with increased force up this narrow slit through the main chain of the Rocky mountains. It was no wonder that we found it deserted.

Wilson had told us that some years previously he had attempted to take horses down the Blaeberry creek to the Columbia river, but he had to abandon them in the heavy timber about halfway down the valley; eventually it was only with the help of some men a week later that he was able, after several days' hard work, to cut them out of the fallen trees. We had now arrived at the beginning of this part of the creek. Peyto, who had gone forward to find the trail, returned with the information that at the next bend of the stream, just below Mount Mummery, the fallen pine trees were so numerous that it would take a week to clear half a mile for the horses. Moreover, a forest fire had been burning for at least a fortnight just below, the smoke of which we had first seen from the summit of Sarbach; however, in spite of all the rain that had fallen, it was still alight. Whilst Peyto was exploring down the valley, we had climbed a peak about 8000 feet high on the west side of the stream. From this point we were able to see a depression in the chain on the opposite side, which we thought probably would lead to the north branch of the Kicking Horse river. But we also saw that great difficulty would probably be experienced in finding a trail up which horses could be taken. Next day, whilst Peyto was again exploring down the valley, Sarbach and I prospected the ground that we thought would be the best route for the horses to follow towards the pass. It was excessively steep, but, as our horses now were in good condition and the loads light, when in the evening Peyto returned with the intelligence that it was hopeless to attempt to follow the Bleaberry creek further, we made up our minds to try on the morrow the new pass to the south.

Next day, after an ascent of about 3000 feet, we camped at the limit of the pine trees at 7500 feet, and on the following day, after a couple of hours' march, reached the pass, where we camped. During the night a heavy fall of snow occurred, which had the effect of clearing away the clouds and bad weather that we had been experiencing since the 27th. This pass (6800 feet) I have named "Baker" pass, after my friend Mr. G. P. Baker. We were certainly the first to cross it with horses, and it seems to be the only route that can be used on the western side of the watershed for baggage animals that will connect with the upper waters of the Bleaberry creek. The next day, September 7, in brilliantly fine weather, we crossed the pass, and, following the north branch of the Kicking Horse river down a very beautiful valley, we arrived at Field on September 9. Baker and Sarbach on the 9th ascended Mount Field from the western side. It is worth while mentioning that the various streams in the north branch abound with trout. From Field we returned to Banff by rail, and thus ended the expedition of 1897.

During the winter of 1897–98 I had, of course, much time and opportunity to consult all the various works and papers on the Canadian Rockies. I obtained a copy of that rare Blue-book, Palliser's 'Journals,' and was surprised to find how much of the ground that we had travelled over had been carefully and accurately described by Dr. Hector. All local knowledge of the district dates from the Canadian Pacific railway survey; the older work has been entirely forgotten. By far the most interesting problem, however, that presented itself to me was, whether the mountain I had seen from the slopes of Mount Freshfield might be Mount Brown or Hooker. Certainly Prof. Coleman, in 1893, starting from Morley, had arrived at the true Athabasca pass, found the historic Committee's Punch-bowl, and his brother had climbed the highest peak on the north, presumably Mount Brown. This peak he found to be only 9000 feet. Could he have been mistaken, or was it possible that there existed two Athabasca passes? The first alternative was almost impossible; there was no doubt whatever that the Athabasca pass had been reached. The second alternative was more difficult to solve. On searching for information as to the individual who had named Brown and Hooker, all I could find were some few references to the botanist, D. Douglas, after whom the Douglas pine is named. Nowhere was there an account of the actual passage through the mountains; nowhere could I find any authentic description or measurement of these peaks except Prof. Coleman's. That the two highest peaks in the Rocky mountains, peaks that have appeared in every map of Canada for the last sixty years, peaks that every Canadian has been taught at school may be found amongst the western mountains beyond the prairies —that these mountains were only, after all, not so high as thousands of others in the main chain, seemed impossible to believe. However, the

best way to solve the difficulty was obviously to return next summer to the mountains, and find out about the high mountain I had seen from the slopes of Mount Freshfield, 20 miles or more to the north-west of Mount Forbes.

In July, 1898, H. Woolley, H. E. M. Stutfield, and myself crossed over to Canada for this purpose; we also wished to continue the map that Baker had been working at the year before; and again, as far as possible, the expedition was chiefly to be a mountaineering one.

On July 31 we started from Laggan, with W. Peyto as our headman; Nigel Vavasour, Roy Douglas, and M. Byers as cook also accompanied us. We started with thirteen riding and baggage ponies, but within an hour of starting reduced that unlucky number to twelve, for we had to shoot one of the worst of the pack after it had broken its shoulder amongst the dead timber. Instead of following up the Bow valley as we did in 1897, I determined to reach the Saskatchewan river by way of the Pipestone pass and the Siffleur valley, in order that we might investigate Mount Murchison. Dr. Hector mentions that it can be plainly seen from the summit of the Pipestone pass, and, in fact, gives a sketch of the mountain as seen from there; I therefore climbed a small peak (8800 feet) that rises out of the centre of the pass (8400 feet). From this point two peaks similar to those in Dr. Hector's illustration could be seen 10 to 15 miles away to the north-west, somewhere between the bottom of Bear creek and the Saskatchewan. This mountain I had noticed last year from Mount Sarbach, when I was at an elevation of 11,100 feet, and although Murchison is higher than Sarbach, yet it cannot be much over 12,000 feet high, if as much. On three separate occasions I have seen all the peaks that lie between the Pipestone, Siffleur valley, and the main range, and always the mountain on the east side of the foot of Bear creek seemed to be the highest. The Siffleur valley is easy to travel in; for the last 15 miles the trail is on the left bank.

We reached the Saskatchewan and the Kootenay plains on August 26, only to find the river in full flood, and in some places even over its banks. Next day we nearly lost half of our horses and baggage. In attempting to round an excessively awkward corner where the trail was partly under water, one after another of the horses fell in, and were rapidly swept away by the swiftly running river. Some of them drifted ashore a short distance below, but some landed on an island out in the middle of the stream, and for some time refused to return. Eventually they were all collected, and we had to camp at once in order that the baggage might be dried. On August 8, after a very long day, we arrived on the old spot at the bottom of Bear creek, having taken two days longer than if we had come by the Bow valley.

We had intended to make an attempt to climb Mount Forbes, but the rivers were in such a state of flood that we determined to at once push on up the north fork of the Saskatchewan, and it was most fortunate

that we did so, for in four days we did not make 10 miles up that valley.

August 9 was our first rest. We went carefully over our provisions, and as we were to return by this route, we "cached" a certain quantity here at Bear creek. Next day the nasty and somewhat dangerous crossing of Bear creek was accomplished safely, and later in the day we managed to find a ford across the Saskatchewan, about 2 miles west of where the north fork joins the western branch; we camped that night on the spit of ground at the junction (4600 feet). On August 11, from the summit of a peak (8650 feet) which I have named Survey peak, I

FORDING THE SASKATCHEWAN.

started the plane-table survey, taking Baker's points of the previous year. Unfortunately, it was useless to try to photograph, owing to the smoke haze that covered everything. This haze we first noticed, as we descended the Siffleur valley, drifting southwards; it continued till the bad weather set in four weeks later. The top pyramid of Mount Forbes was visible over a nearer range that descends to the shore of Glacier lake. Mount Murchison and Mount Sarbach were plainly visible, but Mount Lyell, much to my disappointment, was hidden. The day was sultry, and for the most part the sky was overcast; the mosquitoes even followed us for 1500 feet above the tree-line on to the snow-patches that covered part of the mountain.

The trail up the North Fork of the Saskatchewan is on the east or left bank of the river, but it was absolutely impossible for us to attempt

to cross the raging torrent that was sweeping down the valley; all we could do was to try our best along the west bank. No continuous trail could be found; occasionally we would find a track that enabled us to go ahead for a few hundred yards, only, however, in the end to leave us surrounded by "muskegs," fallen tree-trunks, and strong language. For four days we slowly pressed on up the valley, Peyto and Nigel continually cutting. One day was like another; horses had to be steered round the "muskegs" or got over timber lying in every conceivable position, or we had to wait for hours at a time whilst some particularly bad piece of trail was cleared. From early morning till late at night the sound of the axe was only varied by the earnest entreaties of the men to the horses to either proceed or stick to the trail.

At last the straw came that broke the camel's back, or, in other words, drove us across that muddy white torrent to the east side where the true trail existed. It was on August 15. Early in the morning Peyto and Nigel, as usual, had gone out to cut; for several hours we heard the sound of the axes getting fainter and fainter, till at last the noise faded into the distance. However, at midday they returned, with the tale that about a mile further up the river a large tributary came in from the west; also that the whole valley was flooded and full of "muskeg." As it had taken them half a day already to cut to the beginning of this valley, it would take them at least a week to make a trail up and down it again on the other side. Moreover, they were sick of cutting, and also were of the opinion that no sane people ought to want to go up such a valley. I at once suggested that they must be exceedingly thirsty, and that whisky and water was good. To this they agreed. I waited. In less than one hour Peyto was trying to ford the river on his mare, and in less than two hours we had all got across somehow. Some of the baggage was wet, but with the exception of Woolley's photographic apparatus being slightly damp, no damage was done.

We camped that night on the point of land between this western branch of the North Fork and the North Fork itself. Two days later, on August 17, we camped on the pass that leads across from the headwaters of the Saskatchewan to the Athabasca, at a height of about 7000 feet, on an old Indian camping-ground. During our last march we saw a splendid waterfall, just after we had passed a large glacier that feeds another stream of the North Fork.

On this pass we made up our minds to stop for some time, as we had calculated that the big peak we were in search of could not be very far away towards the north-west. As far as we could ascertain, Wilcox was the first person in modern times to explore this pass, but there is little doubt that earlier in the century, when Jasper House was one of the Hudson Bay Company's posts, all this country was much more frequented by those engaged in the fur trade. As Wilcox was the first to traverse this pass, it might be called the "Wilcox" pass. Our

provisions at this period we found were getting very low, and it was with consternation that we discovered that we had only meat left for about three days. Nigel assured us, though, that there were plenty of wild sheep in the neighbourhood, for he had been to this pass the previous autumn with the only shooting party that had ever wandered amongst these wild mountains. In order to replenish our larder, Stutfield said that he would on the morrow see whether he could find and shoot some of these sheep, for our mountaineering was yet before us, and no ascents of big peaks can be made on insufficient food. Woolley and I, not being considered desirable in Stutfield's party, started on our own account to climb a fine rock and snow-peak opposite our

IN THE NORTH FORK OF THE SASKATCHEWAN.

camp towards the south-west. With considerable trouble, and after a fine climb, we finally got to the top at 5.30 p.m. A magnificent view lay before us in the evening light. To the south at our feet lay the great glacier that feeds the North Fork of the Saskatchewan, and we could see an easy way up its true right bank to nearly where it joined a great snow-field. At this point, instead of being hemmed in by the side of a valley, lay a flat and marshy piece of land rather below the level of the glacier; the other end of this piece of land drained down to the Columbia river on the west—evidently it was an easy pass, but difficult or impossible for horses, for some distance would have to be traversed over the glacier. Further away to the south, a high peak lay between this glacier and the west branch of the North

Fork, flat-topped and covered with snow; on its eastern face a precipitous wall of rock. Mount Lyell and Mount Forbes could be seen far off in the haze. But it was towards the west and north that the chief interest lay. We were looking on country probably never before seen by human eye. A vast snow-field, feeding many glaciers, lay at our feet, rock-peaks and snow-covered mountains were ranged around it, whilst far away to the westward we could just see through the haze the valley of the Columbia river. This great snow-field, from which the Saskatchewan glacier takes its rise, also supplies the ice for another glacier at the headwaters of the Athabasca; whilst to the west we saw the level snows bending over to flow down more than one channel, feeding, when melted, the rivers that empty themselves into the Pacific ocean.

A magnificent peak, that is probably near to 14,000 feet high, stood alone keeping guard over these unknown western valleys. We have ventured to name it after the Right Hon. James Bryce, President of the Alpine Club. Some few miles to the north of this peak, and also on the opposite side of the snow-field in a north-westerly direction, the biggest peak of all was seen. Chisel-shaped at the head, covered with glaciers and ice, it also stood alone, and I at once recognized the great peak I was in search of; moreover, a short distance to the north-east of this peak another, almost as high, also flat-topped, but ringed round with sheer black precipices, reared its head above all its fellows into the sky. Here, then, we thought, were Brown and Hooker. Rapidly I drew lines in all directions to these new peaks on my plane-table, but hurry as fast as I could, it was 6.30 p.m. before we started down from the summit of this mountain, which we have named Athabasca peak. Its height by mercurial barometer is 11,900 feet. It was 10.45 when we got back into camp, to find that Stutfield had killed three if not four sheep. The provision question, therefore, was satisfactorily settled for some time to come.

The glacier that fed the headwaters of the Athabasca river we have called the Athabasca glacier. Two days later we all three camped with sleeping-bags as far up its right bank as possible, and in the dark at three o'clock next morning started up the glacier by lantern-light. This glacier descends from the snow-fields above in three successive icefalls, the last one very much crevassed. It was not till past seven o'clock that we finally emerged on to the snow-fields above. The day was warm and sultry, making us all feel tired. For several hours we walked across the snow towards the high chisel-shaped peak; to the westward Mount Bryce sent its three peaks high above us into the air. A double-headed peak on the north hid the high rock peak we thought might be Brown (afterwards named Mount Alberta), when we were on the top of the Athabasca peak. But the peak we were walking towards was farther off than we thought, and as it seemed very unlikely that we should get to the top of it that day, we turned, after having looked down into a

vast amphitheatre that lay between the chisel-shaped peak (afterwards named Mount Columbia) and the double-headed peak, or the Twins. This amphitheatre is the source of another branch of the Athabasca. To the south-east of where we were, and almost on our way home, rose a great dome of snow. After a hot and very tiring climb through soft snow that broke under our feet at every step, we finally got to the summit at 3.15 p.m. (11,650 feet). Although we did not know it at the time, we were standing on probably the only peak in North America the snows of which, when melted, find their way into the Pacific, the Arctic, and the Atlantic oceans; for its glaciers feed the Columbia, the Athabasca, and the Saskatchewan rivers.

But our expedition had mystified us more than ever about Mounts Brown and Hooker. There was no pass between the two highest peaks we had seen, and where was the Committee's Punch-bowl that should lie between them? It is true that we had only seen a small portion of that western branch of the Athabasca whose source lay at the feet of these peaks, but at the same time we had seen that this western branch at its head was hemmed in by the highest mountains in the Canadian Rockies.

Our next move was in search of the lost Punch-bowl. The weather, although it looked unsettled, still kept fine, and on August 24 we took part of our camp for a three or four days' expedition across the pass and down into the east branch of the Athabasca river, hoping to find a pass through to the westward, which would join the east with the west branch. We soon found that no such pass existed, and that to ascend this western branch to its source we should have to descend the eastern branch for at least 25 miles to the junction of the two streams. For this we neither had time nor provisions; so we had to content ourselves with camping out near a glacier (Diadem glacier), and ascending a peak, Diadem peak (11,500 feet). From the summit we looked over into the western branch of the Athabasca, and only a few miles away the flat-topped rock peak (Mount Alberta) rose above us more than 2000 feet. It was during the ascent of Diadem, on August 26, that the weather finally broke, thunderstorms and hail driving us back wet through to our camp.

We returned to our camp on the Wilcox pass the next day, without having solved the question of either Mounts Brown or Hooker, or the Committee's Punch-bowl. Our provisions were now again getting very short, so there was nothing to be done except turn homewards towards Bear creek; the weather also was getting worse and worse. On August 28 we started: Stutfield and Peyto made a *détour* round the Sheep hills and over on to the headwaters of the Brazeau, to try and find some more sheep, but were unsuccessful.

All day on August 30 we were kept in a camp some distance down the North Fork of Saskatchewan by deluges of rain. But on the following day, August 31, by getting up very early and pushing on till 5.30

in the evening, we managed to reach the camp at the foot of Bear creek, where our provisions were "cached." During this march, which was made on the east or left bank of the river, we passed no less than five camps we had made about a fortnight before on the opposite side.

From this camp at Bear creek, on September 2, we attempted to climb Mount Murchison, but, owing to the bad weather, only succeeded in reaching a point about 8800 feet on a ridge. On this ridge some most interesting fossil remains were found of what looked like a petrified pine forest, where the trees had been broken off about a foot from the ground. I have been told, however, that

FOSSIL REMAINS ON MOUNT MURCHISON

it may be the remains of some gigantic prehistoric seaweed. For the next two days the weather continued gloomy and damp till the afternoon of the 4th, when a heavy snowstorm came on, which forced us to camp in a cold and miserable spot just short of the Bow pass. But this was the last of the bad weather, and the week that followed was gloriously fine; the haze that had hidden all the distant views during the first four weeks of our trip was gone, and two days later, when we ascended a peak (Thompson peak) lying just on the north of the top of the great icefall of the upper Bow glacier, from its summit (10,700 feet) by far the most distant and clear view that we had during the whole of the expedition was obtained. Mounts Assiniboine, Forbes, Sir Donald, Freshfield, Lyell, and those over the Athabasca, were clearly visible. The peak was covered with fresh snow.

On September 8 we arrived at Laggan railway station, having been away from civilization for nearly six weeks. The link with the mountains and camp life was broken; it was hard to realize that we should no longer sleep under an Indian "teepee" in a sleeping-bag, and feel the fresh air play over our faces during the still nights, nor should we listen to the noises of the streams nor the wind in the pines much longer. Our small world was shattered, our conversation and all the small things that had interested us for the last six weeks, when placed

MOUNT ABERDEEN.

before the inhabitants of the civilized world, would either fail to interest or fall on the ears of those who would not understand. Still, civilization has its advantages, and gains much by contrast with the life that is experienced amongst the mountains and the wild and desolate places of the Earth.

It was not till I had returned to England that the question of the Committee's Punch-bowl and Mounts Brown and Hooker was finally solved. Again, with greater care, I looked up every reference I could find that dealt with the Rocky mountains of Canada and British Columbia. At last I discovered a reference in Bancroft's 'History of

British Columbia' to the journal of David Douglas the naturalist, which had been published together with a variety of other matter in the *Companion to the Botanical Magazine*, vol. ii. pp. 134–137, by Dr. W. T. Hooker.

This journal deals with Douglas's journey over the Athabasca pass. He started from Vancouver on March 20, 1827, and, travelling *viâ* the Kettle falls and the Columbia river, reached Boat Encampment on April 27, and the summit of the Athabasca pass on May 1 at ten o'clock in the morning. To quote his journal: "Being well rested by one o'clock, I set out with the view of ascending what seemed to be the highest peak on the north. Its height does not appear to be less than 16,000 or 17,000 feet above the level of the sea. After passing over the lower ridge, I came to about 1200 feet of by far the most difficult and fatiguing walking I have ever experienced, and the utmost care was required to tread safely over the crust of snow. A few mosses and lichens are observable, but at an elevation of 4800 feet * (*sic*) vegetation no longer exists. The view from the summit is of too awful a cast to afford pleasure. Nothing can be seen, in every direction far as the eye can reach, except mountains, towering above each other, rugged beyond description. . . . The majestic but terrible avalanches hurling themselves from the more exposed southerly rocks produced a crash, and groaned through the distant valleys with a sound only equalled by that of an earthquake. Such scenes give a sense of the stupendous and wonderful works of the Creator. This peak, the highest yet known in the northern continent of America, I feel a sincere pleasure in naming 'Mount Brown,' in honour of R. Brown, Esq., the illustrious botanist. . . . A little to the southward is one nearly the same height, rising into a sharper point; this I named 'Mount Hooker,' in honour of my early patron, the Professor of Botany in the University of Glasgow. This mountain, however, I was not able to climb.

"The Committee's Punch-bowl is a small circular lake 20 yards in diameter, with a small outlet on the west end, namely, the Columbia, and another at the east end, namely, one of the branches of the Athabasca."

This, then, was the authentic account of these two mountains, and to Prof. Coleman belongs the credit of having settled with accuracy the real height of these peaks. For nearly seventy years they have been masquerading in every map as the highest peaks in the Rocky mountains.

No doubt now remains as to where Brown and Hooker and the Punch-bowl are. That Douglas climbed a peak 17,000 feet high in an afternoon is, of course, impossible; the Mount Brown of Prof. Coleman, 9000 feet high, is much more likely. There is, therefore, only one

* 14,800 feet more probable.

Athabasca pass, and on each side of its summit may be found a peak; the higher of the two is on the north side—it is Mount Brown, 9000 feet; on the south side the mountains are still lower, and one of the points on the ridge is Mount Hooker. Between them lies a small tarn, 20 feet in diameter—the Committee's Punch-bowl, that may be found marked in almost every map of Canada.

Those peaks to the south, amongst which we wandered last August, are therefore new; and standing as they do, grouped round the glaciers that feed three of the largest rivers in Canada, the Athabasca, the Saskatchewan, and the Columbia, they probably constitute the highest point of the Canadian Rocky mountain system.

Before the reading of the paper, the PRESIDENT said: The paper to be read this evening will be a very interesting one by Prof. Norman Collie on "The Exploration in the Canadian Rocky Mountains, and the Search for Mounts Hooker and Brown."

After the reading of the paper, the following discussion took place:—

Mr. G. P. BAKER: You will have observed that the little geographical and map-making work which the two expeditions led by Dr. Collie have accomplished, is due more to our mountaineering instincts than to a search after geographical knowledge. Dr. Collie has told you that we were in a country beyond the limits of the map-maker, and that it was due to T. E. Wilson, of Banff, that we were able to obtain some information of the country we were to traverse. He was able to indicate on paper the number of lakes and washouts we were likely to pass, the glaciers we should see, and muskegs to avoid. I seized the opportunity offered me by Mr. Parker, of Columbia University, to obtain the reversion of his plane-table, and by accident we were able to pick up the survey of the Topographical Department of Canada, and, having got our base-line, Dr. Collie continued it last year right away up to the headwaters of the Athabasca. I must say we had, besides photographic apparatus, compasses, and so forth, and Dr. Collie carried with him his portable mercurial barometer, which he invented, and which was described by him in the Society's *Journal* (vol. x., 1897, p. 203).

About the exploits of Wilson I would like to say something. Wilson was originally employed by the Railway surveyors in 1881, and the story he tells is this; it is worthy of record in the journals of this Society. In 1881 four parties under Major A. B. Rogers were in the mountains. One, under C. Miles, was sent up the Kanaskis; another, under McMillan, up the Simpson pass; another, under C. Lett, up the Kicking Horse; another, under Sproat, which Wilson joined, was deputed to survey the Bow. Not much result came from that year's work, as the parties got away too late, and were ordered back early in October to return to Winnipeg. In the following spring, 1882, four parties were out again. Major Hurd, an assistant to Major Rogers, did excellent work, and it is the opinion of Wilson that had his route been followed, the company would not be having the "washouts" and delays the railway is now subject to. All the parties in 1882 were put to work on the Bow and Kicking Horse and the Columbia valleys, and in the autumn, one in the Selkirks. Major Rogers was satisfied with the reports of all the passes, with the exception of the Bow and the Howse pass, and ordered Wilson to go through alone on foot. He accordingly started on foot from where Laggan now is, making good time to the valley of the Little Fork, where, finding the torrents very much swollen, he was unable to cross and recross the river as occasion usually arises, when horses are taken with the party. Eventually he succeeded in reaching the Columbia river,

at the old Moberley cabins, on the eve of the eleventh day, and there met Major Rogers, who was very uneasy on Wilson's account. He told us that he had eaten his last bannock when in the Blaeberry, and had left pieces of his clothes all along the route, so treacherous is the timber. Wilson has made many excursions into the mountains, but never has carried so "big a load of doubt and so little grub and blankets as on that occasion."

The reports of Captain Palliser and Dr. Hector, both recipients of the Founders' medal, are most delightful reading. Their map is of course, in its details, inaccurate, but it goes to fill up a gap in that great lone land. The work now being carried on by the Topographical Survey of Canada is most excellent. They have a good staff of men; but, as they pointed out to us in Ottawa, the country is so large, that the survey of the mountains must be always the last thing they will take in hand. They have done good work to the south of the line, but in the north it only extends for a very few miles. The rough survey map that was made by the expedition under Prof. Coleman has been fitted to our own. There is one expedition into this country that Dr. Collie did not refer to—that of the Earl of Southesk in 1859. It is very difficult indeed to determine exactly where he was; but, roughly speaking, he must have been in the neighbourhood of the headwaters of the Athabasca, journeying south to the Bow valley in a second parallel valley to the main range. The peculiarity of these valleys is that, instead of being at right angles to the main watershed, they run parallel. We traversed the first valley, and I think the Earl of Southesk must have been in the second valley.

Taking Dr. Hector's reports, and comparing his rate of travel with our own, we compare very unfavourably indeed. It took him two days to do what we did in four, and Dr. Collie has told us that in the upper Saskatchewan he did not make 10 miles in four days. I can only conclude that the trails have fallen into a "bad state of repair," due to forest fires and to the want of Indian hunters and trappers, who no longer find the country as plentiful in game as in former years.

Mr. STUTFIELD: I very much regret Mr. Woolley is not here. I regret it all the more because, after the exhaustive paper by Dr. Collie and Mr. Baker's speech, there is little to say. As you will understand from the paper, we had a most delightful trip, and some very charming climbs. Dr. Collie did not tell you of the ascent of Athabasca peak, the very best climb of the expedition, which I unfortunately missed, having to go after meat for the expedition by myself, because, as you have heard, "the Collie would not go after the sheep." There is one thing I would like to say to you as to the sport, in case any members of the Geographical Society who are keen and ardent sportsmen might think we were living in a sportsmen's paradise. The contrary was the case. I was hunting several days, and kept a good look-out all the time, and except that one single day, which I look on as the luckiest in my life, I never saw any game. If people want sport they must go west. But if there is no game, there is something much better. Splendid mountains and magnificent scenery, new Alps, and a new Switzerland, larger than the old one, and scarcely inferior in beauty of the mountains and the varied charms of lake, forest, and river scenery. But, unfortunately, it is a Switzerland very little visited. At the bottom of Bear creek, where we made a cache of our provisions, is a spot where five large valleys converge, all leading to beautiful mountain scenery. There, I venture to think, in the days to come will be the Grindelwald or the Chamounix of the Canadian Alps, but now it is all "wasting its sweetness on the desert air." It gets no encouragement from the authorities in command. The Canadian Pacific railway people are sending two Swiss guides to Glacier House next year; but, though exceedingly keen business men, they have only just begun to tumble to the commercial value of glaciers. I was talking to a man at Glacier House, British

Columbia, and said to him, "I venture to say that in the course of ten years your glaciers and mountains will bring in a great deal more money than all your gold-mines put together." He looked at me, but said nothing. I think there is a great deal more to be done in opening up the beauties of this scenery than is being done now. I was talking to Sir William Van Horne about it, and he suggested that if one or two of us broke our necks it might be a good advertisement for the country; unfortunately, we did not comply with the suggestion. Out there they look on all climbers, as so many people do at home, as lunatics, but I would point out that the lunatics pay, and they ought to be encouraged. Now, though we are told it is foolish to prophesy, I venture to say that, just as Mr. Leslie Stephen, in that brilliant work which has become a classic, has made familiar to people on this side of the Atlantic the playground of Europe, so Dr. Collie and his predecessors, in their mountaineering in Canada, have opened out the new playground of America. No doubt America has playgrounds of her own—of a sort. Though she has mountains as high, possibly a little higher, than these, they are lacking in surroundings which to us climbers, at any rate, are indispensable—I mean the glories of the eternal snows, and the marvels and mysteries of the upper ice-world. In these things America cannot compete. Therefore I think that Dr. Collie, Mr. Baker, Prof. Dixon, and others, have done excellent service in opening up the country, and I shall always esteem it a privilege to have been allowed to take a small part in the work.

Sir MARTIN CONWAY: I have no special comment to make on this paper. But I should like to ask Dr. Collie one question—why it was necessary for him to go to these mountains last year, when I was otherwise employed; why could he not have waited and taken me with him? It seems to me that the scenery of these mountains, in which he has done so much good work, is amongst the most beautiful mountain scenery it has ever been my good fortune to see reflected on this sheet. The common but erroneous opinion seems to be that all mountain scenery is very much alike; as a matter of fact, there is the widest possible diversity in the character of mountain scenery in different parts of the world. The Alps always seem to me to be the typically beautiful range, where green slopes and forests and lakes, and snowy peaks of all sorts of varied forms, are most beautifully mixed and mingled together. If you wander further a-field, you will find in the Caucasus a range more grandiose, but likewise beautiful, in a somewhat similar style. If you go further to the Himalayas, you will find in them the newly broken edge of the Earth's crust, lifted aloft with its splintered edges. In different parts of Asia you find varieties of that type of mountain, relatively new mountains, the crinkled-up and cracked off edges of the Earth's newly broken crust. In the long range of mountains forming the backbone of North and South America, from the Klondike to Tierra del Fuego, there are many varieties of beautiful mountain scenery. There are in some parts ranges of mountains, elevated by the pressure of the world, and worn down by the action of long-continued ages of frosts, by air, and water. You will find ranges, or rather areas, where the volcanic forces of the interior of the Earth are, or have been, strongly active, and there mountains take a different form, extremely lofty volcanic cones rising out of deserts of absolute barrenness, surrounded by dried-up lakes which have left no trace of their previous wetness save in the flatness of the white saline deposits. Further south comes a region thatched with forest of the densest kind, that I was reminded of to-night by the photographs we have seen, where the trees rise out of ruins of tangled remnants of broken trunks deep in moss and sodden with water. Out of these forests rise mountains draped with icy glaciers going down into the sea, and the long mountain range itself finally founders into the Antarctic ocean. You have all this variety—you

have mountains in the Arctic, poking their noses out of the great flood of ice, and mountains in the tropics rising out of deserts. Mountains, wherever you find them, have qualities of their own; there is an immense variety of type and of charm, but in all this variety of beauty of mountain scenery, there are no mountains which combine grace and at the same time boldness of form with forest and with water more beautifully, as far as I can judge, than those mountains Mr. Collie so well described to-night, and I can only conclude by saying it is very hard lines that he did not postpone his trip, in order that he might have taken me with him.

The PRESIDENT: We have been reminded by Mr. Baker that Captain Palliser and Dr. James Hector, who may be considered the pioneers of the Canadian Rockies, were recipients of our Royal awards, and I think it must be with great satisfaction that the Fellows of this Society remember that it was due to our urgent and pressing representations that the expedition of Palliser for the discovery of passes over the Rocky mountains was organized and undertaken. Prof. Collie and his companions have very worthily trodden in the steps of these eminent explorers; they have gone over ground which was entirely unmapped; they have ascended mountains and done some magnificent mountaineering, under, as you have heard, very great difficulties; and I am sure you will all wish me to express your thanks to Prof. Collie and his companions for the most interesting paper which he has delivered so admirably to you this evening, illustrated with such beautiful slides.

SOURCES OF THE SASKATCHEWAN.

By WALTER D. WILCOX.

THE Saskatchewan, one of the larger rivers of North America, takes its source in the rugged fastnesses of the Rocky mountains, and flows eastward over the sparsely inhabited plains of southern Canada till it reaches Lake Winnipeg. Save for a rapid at the very mouth, the river is navigable for steamboats about 1000 miles. Strangely enough, its two chief branches come from the same ice-fields in the high Rockies, and, after diverging several hundred miles, unite far out on the rolling plains about 900 miles from their source. The North Saskatchewan and the Bow or South Saskatchewan are, at their point of union, each about the size of the Rhine.

From the Canadian Pacific railroad, the easiest way to reach the headwater tributaries of the Saskatchewan is by ascending the Bow river to its source. My friend, Mr. R. L. Barrett, and I left the station of Laggan on July 12, 1896, bound northward, in the hope of reaching the Athabasca pass and measuring the height of Mount Brown and Mount Hooker. For such an extensive journey, which would require two months to accomplish, we had five saddle-horses and ten pack-horses to carry our provisions and camp necessaries. To manage the horses and arrange our camps, we engaged two skilled packers, Tom Lusk and Fred Stephens, the latter an expert axe-man, and also a cook for the party.

On the third march from civilization we came to the upper Bow

lake, which is about 20 miles from the railroad. This lake, though only 4 miles long, has fine surroundings, being closely pressed by grand precipices hung with ice and frequently echoing to the thunder of avalanches, while its indented shores and green forests make it one of the most attractive spots in the Rockies. A muddy stream descends from a glacier beyond the head of the lake and pollutes its clear waters, while a clear trout-brook comes from an upland valley lying to the north-west, and this latter stream is perhaps the true source of the Bow. Up the valley, countless springs and melting snow-banks, with large tracts of swampy land, contribute their waters from every side. The level of the valley rises into a gently sloping plain, the last rivulet is passed, and one stands on the divide overlooking the Little Fork of the Saskatchewan river.

Those who have reached this region have had an opportunity of seeing one of the grandest views that the mountains offer. For to the west are the lofty peaks of the highest range of the Rockies, buried in perpetual snow, and discharging their surplus ice by glaciers in every lateral valley. Deep set amid dark precipices, such a glacier is to be seen west of the pass. From two cavernous ice-tunnels a large stream issues and sweeps in a devious course over a barren gravel wash for a mile or more, till it enters a lake. Then, as the clear stream leaves the lake and winds away to the north-west, it is lost to view, hidden amid deep forests, and only reveals its course here and there, where it expands into some one or other of the many lakes which this valley contains. Between the spurs of the summit range on the west and a parallel range on the east, the great trough or valley which carries the Little Fork and the North Fork of the Saskatchewan draws away in a nearly straight line for more than 60 miles, till its end is lost in the blue haze of distance.

The summit of the pass is a delightful region, situated at an altitude of 6700 feet, or only 300 feet below tree-line. The woodland is consequently rather open, and abounds in meadows, while the spruce trees, many of which must be four or five centuries old, have that symmetrical beauty of form rarely seen where there is less space and light in the crowded forests of the deep valleys.

It seemed best to camp on the summit, as a forest fire had broken out in the Little Fork valley some miles distant, and was sweeping furiously up the mountains to the east. Mr. Barrett and one of the packers spent the next day by making a horseback excursion to investigate the extent of the fire and see if there were a way through. They returned in the evening, after a hard day's travel, without having reached the fire. It was evident that the distance had been much underestimated, perhaps owing to the great extent of view from the pass; but it was small comfort to know that the fire was much further off than had been supposed, as we had to change our ideas of its

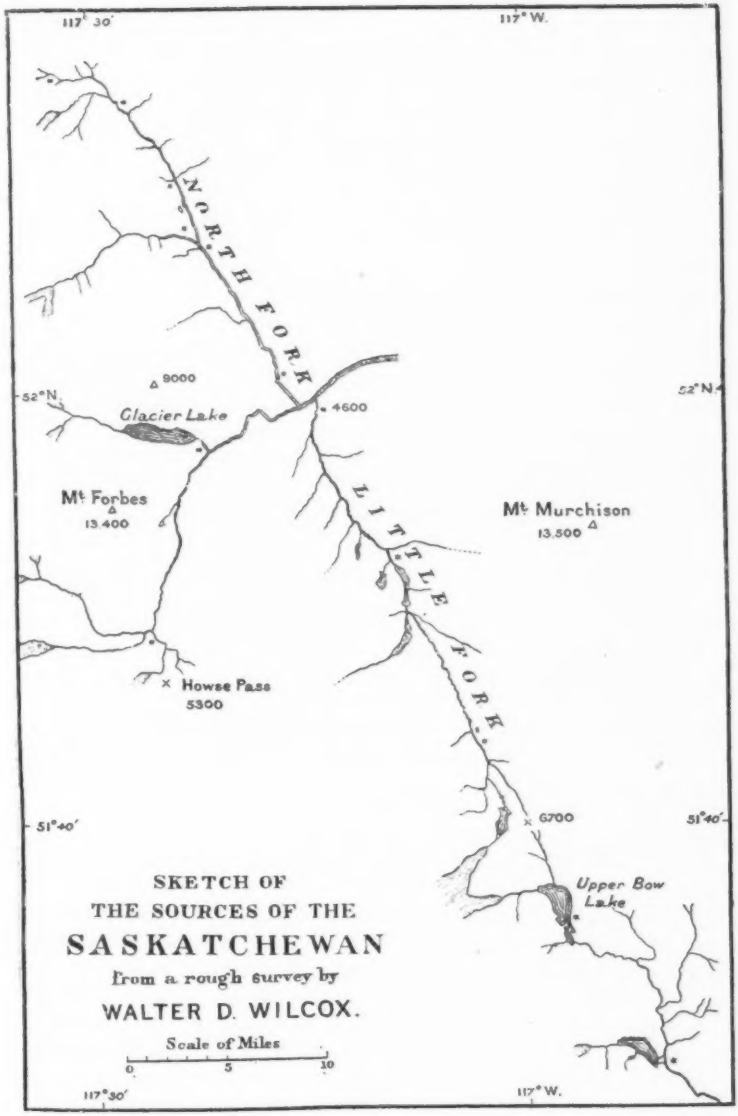
magnitude. As there was nothing to be gained by waiting, we moved a short march into the valley the next day.

The descent into the Little Fork valley is much steeper than on the other side of the pass, and in the first three miles the trail drops about 1000 feet. These mountain trails were used by the Indians at an indefinite period before the whites came into the country. In every important valley, especially where game abounds, there are trails which prove of great value to the traveller.

As our horses were winding through a deep forest, a bird appeared which resembled a pine bullfinch, flitting from tree to tree and following us closely. Somewhat later it gave the most remarkable instance of tameness that I have ever seen. Having followed us for about 2 miles, it waited in a tree during the bustle and confusion of making camp; but during the afternoon, when all was quiet and some of our men were asleep, the bird became exceedingly familiar, and showed no fear to walk on the ground near us, and finally to perch on our extended hands. It was soon evident that the object of our visitor was to catch mosquitoes, which were hovering in swarms around our heads. It pecked at a ring on my hand, at our needles, and in fact any metal article; but the climax was reached when by accident the bird saw its own image in a small looking-glass which lay on the ground. Then, with extended wings and open bill, it uttered cries of rage and pecked madly at the glass where an enemy appeared. Among the solitudes of mountain forests, squirrels, finches, and whiskey-jacks often show a remarkable confidence in man; but this particular instance is noteworthy, because the bird would light on our persons, even after it was momentarily though gently detained several times as a prisoner in my hand.

Further investigation showed that it was possible to get our horses through the fire, which had spent its energy on a large extent of green timber. So, after three hours' travel from camp, we came to the burning trees where the fire was advancing slowly, as there was a calm. Then came several miles of the recently burnt area, now changed to a forest of blackened sticks, some of which were already fallen, with here and there a column of smoke rising from smouldering moss, and everything half concealed in a snowy covering of ashes. At the other edge of the fire there was more danger, and frequently some tree would flash up and send a scorching heat towards us. We were chiefly anxious that the packs should not take fire and cause a stampede among the horses, so for a considerable distance we drove our animals along the edge of a lake, and frequently waded deep in the water to avoid the heat of blazing trees.

After an exhausting march of six hours, we made our camp in a muskeg or swamp, about half a mile from the fire. The wind, however, which had been increasing for a time, began to carry the fire towards


117° 30'
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NORTH FORK
△ 9000
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Glacier Lake
4600
52° N.
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× Howse Pass
5300
51° 40'
6700
51° 40'
Upper Bow Lake
SKETCH OF
THE SOURCES OF THE
SASKATCHEWAN
from a rough survey by
WALTER D. WILCOX.
Scale of Miles
0
5
10
117° 30'
117° W.

us, and our situation soon became alarming when some heavy timber began to blaze, and the columns of flame, shooting hundreds of feet into the air, made a terrifying roar, which caused our horses to stop feeding. At one time a funnel-shaped whirlwind about 200 feet high formed over the heated area and remained there a few moments.

At the rate of progress the fire was making, we should soon have been surrounded had we not packed up and moved a mile further down the valley. The second camp was made by the side of a considerable stream, wide enough to stop the fire. But towards evening cloud-banners began to form at the peaks of the mountains, and in the early morning, after many weeks of drought, it began to rain. Rain fell steadily for ten hours, and fortunately extinguished, for a time, the fires that were destroying this beautiful valley.

We were now two days' journey down the Little Fork valley, a distance of about 18 miles in a straight line. We remained in camp the next day, to do a little survey work from a mountain to the east. From this point, at an altitude of 8000 feet, the Little Fork valley appears straight, deep, and comparatively narrow, with a number of lateral valleys coming in from the west side, and cutting the mountain masses into projecting spurs. The strata of the mountains are for the most part nearly horizontal, and the cliffs are frequently almost vertical. There were six lakes in view from our survey point, of which two, each about a mile long, were merely expansions of the river; three were in lateral valleys; and one lay far up the valley where the river takes its source. The lateral valleys head in the summit range to the west, and have probably never been visited.

The scenery is very grand near the lakes. A striking peak about 10,000 feet in height, with a precipitous rock face and wedge-shaped summit, stands guardian over these lakes, and together with the jagged mountain near it helps to give a gloomy fiord-like appearance to the region. Mount Murchison is supposed to lie in a group of mountains to the east of this place, and, as seen from the Pipestone pass by Dr. Hector, was estimated to be 13,600 feet high. It has never been seen from the Little Fork valley, though it cannot be more than 10 miles distant.

On July 22, we marched six hours and reached the Saskatchewan river. The trail is very good, and runs for many miles through forests which are of splendid timber, especially in the great valley of the Saskatchewan. At the forks or junction the Saskatchewan is a rapid stream about 150 yards wide, and apparently quite deep, and the pure blue waters of the Little Fork are soon lost to view in the muddy volume of the main river. The Saskatchewan valley is about 4 miles wide at this point, the river itself flowing between bluffs of glacial drift, and while the massive mountains on every side are between 10,000 and 12,000 feet high, they are less imposing than usual because

of their distance. The main river runs about north-east, cutting through the mountain ranges, and taking its source to the south-west among the highest glacier-bearing peaks of the summit range.

A very large tributary, which we came to call the "North Fork," comes in from the north-west, and joins the main river about one mile above the Little Fork. This river is not correctly placed on Palliser's map; nor was there any available information about the region whence it comes. Even the Stony Indians who travel through these mountains know little of this river, because it is said that many years ago one of their tribe was lost while hunting in that region, and they think he

SOURCE OF THE LITTLE FORK OF THE SASKATCHEWAN.

was destroyed by an evil spirit dwelling there. At all events, they will not take chances in visiting that part of the country now.

Our route to the Athabasca, however, lay up this river, and our first duty was to find a ford across the Saskatchewan. A day was spent in finding a safe place, as the river was in summer flood, though not at its highest stage. Mr. Barrett, with characteristic energy, discovered a ford about one mile up-stream, where the river spreads out among low sand islands to the width of nearly half a mile.

A sense of relief came when, on the next day, after fording the turbulent Little Fork, we had crossed the main river, which is of great size at this point, only 30 miles from its most distant source, and were safely on the north side of the Saskatchewan. Turning northwards along a high bluff, we came in a short time to the North Fork, which

appears to equal the so-called Middle Fork or main river. About one mile above its mouth the North Fork flows between rocky banks, and there is a fall or rapid in a constricted channel blocked by immense masses of fallen cliff, where the water surges in foaming breakers and dark whirlpools. For a mile or so above this fall there is a fine trail through a light pine forest, and then comes a burnt area with trees crossed in such confusion that it required two hours to make half a mile, and we were so much delayed here that our progress for the day could not have been more than 3 miles in nearly six hours.

On the following two days we advanced about 10 miles up the valley, having a trail wherever there were green forests, but suffering much delay from burnt timber and muskegs. On one occasion, when marching along a steep bank of the river, a pack-horse stumbled among loose logs and rolled over into a deep pool. This was one of our strongest animals, and was carrying over two hundred pounds of flour, a burden that kept the poor beast for a short time at the bottom of the river, but after some violent struggles the horse came right side up and climbed out. No damage was done, however, as flour only absorbs water to a slight depth, and very soon makes an impervious layer on the outside.

Ten miles up the river a stream comes in from the west and unites with the other. As these two streams were about equal in size, we were at a loss which one to follow in order to reach the Athabasca. In order to get a more extended view of the country, an ascent was made of a mountain which lies between the two rivers. On the summit, at an altitude of 3400 feet, it was seen that the western stream takes its source in a large glacier about 12 miles distant. A fair idea of the branch streams was given by the valley openings, but it must be confessed that less is known about this river than of any other source of the Saskatchewan under discussion. As a result of this ascent, we were firm in the belief that our route did not lie up the western branch. The other valley, however, seemed exceedingly deep and like a canyon in the very short distance that it was visible at all. Though the air was smoky from forest fires in spite of considerable rainy weather of late, I tried some photographic work, and during a brief but fatal moment when I was reaching for a plate-holder, the strong wind blew my camera over and broke it badly on rough limestone rocks. The most fragile parts, the ground glass and lens, fortunately escaped, while the wood and brass work were in pieces. With a tool-box carried for such emergencies, the camera was reconstructed after a few hours' labour, and did excellent work later in the trip. Our men returned in the evening, and reported that there was a trail in the deep valley to the north-west.

The next two days we only advanced about 10 miles, because of the uncertainty of the trails, the rough nature of the forests, and repeated crossings of the river. This slow progress was made in spite of our

custom to have one or two men explore and cut out the trail for the next day as far as possible each afternoon. In this place the river is at the bottom of a narrow valley, the sides of which are smooth precipices adorned here and there by clumps of trees clinging to the ledges. Streams and springs from far above come down in delicate curtains of spray or graceful waterfalls wafted from side to side by every breeze. The flood of glacial waters sweeps over a gravel-wash in a network of channels, with the main body of water swinging from one side to another of the valley and washing against steep or inaccessible banks. This condition of things caused us to cross and recross the stream almost constantly, and though the fords were in general not more than 3 feet deep,

SWAMP IN THE LITTLE FISH VALLEY.

the icy waters ran with such force that our crossings were not without excitement. In spite of the best judgment and care of our packers, some horses got beyond their depth several times and had to swim across. As the saddle-horses are guided by riders, they rarely lose their footing; but the pack-animals coming along in a bunch, confused by the shouting of the men and the roar of the rapids, hesitate, and often enter the river a little above or below the best ford, and so get into deep water. Dangerous rapids or a log jam below make such occasions critical, not alone for the safety of the horses, but even for the success of an expedition, in case a large quantity of provisions are lost. Pack-horses cannot swim very far with their tight cinches, and, moreover, the icy water of these mountain streams paralyzes their muscles very quickly.

The trail at length leaves the river and makes a rapid ascent through

forests on the east side of the valley, so that in an hour we had gained 1000 feet. Through the trees we caught glimpses of magnificent scenery, the uniting streams in the canyon bottom, the mountain-sides heavily timbered or rising into snow-summits, and to the west an immense glacier, which was the source of the largest stream. The North Fork was rapidly dividing into its ultimate tributaries. The sound of mountain streams falling in cascades, the picturesque train of horses, each animal cautiously picking a safe passage along the rocky pathway, the splendid trees around us, our great height, and the tremendous grandeur of the mountain scenery, all helped to make our surroundings most enjoyable. Above the sound of wind in the forest there was presently heard the roar of a waterfall, and half a mile beyond we saw a large stream apparently bursting from the top of a fine precipice and falling in one magnificent leap down a great height. Through a notch in the mountains there was another fall visible some miles distant, fully twice as high as the one near us. It was learned later that every stream descended into the canyon by a fall and a succession of cascades.

We camped in a beautiful wooded valley with much open country, at an altitude of 6300 feet above the sea. Near our tents was the river, which at this place is a comparatively small stream of crystal-clear water. In the afternoon, with one of the men, I ascended a small mountain which lay to the west of our camp. From this summit two passes were visible, one 5 miles to the north, and the other more distant and towards the north-west. The view west was more extended. There was a large straight glacier directly before us, the one we had seen earlier in the day, and which supplies the greater part of the water of the North Fork. This glacier is visible at least 6 or 7 miles, but it may extend much further behind the intervening mountains. The glacier has no terminal moraine, and slopes down by a very even grade to a thin knife-like edge where it terminates.

The next day Mr. Barrett went off to climb if possible a high mountain, over 11,000 feet in altitude, north of our camp, while one of the packers and I started to explore the pass to the north-west. The other packer spent part of the day investigating the other pass. This division of labour was a great saving in time. At our conference in the evening, which did not occur till midnight, when the last member came into camp, it was decided that the pass to the north seemed unfavourable as a route to the Athabasca. Mr. Barrett had failed in his ascent, because the mountain was more distant than it appeared. The pass to the north-west seemed more favourable, and on the next day we moved our camp so as to be almost on the summit. The last and longest branch of the North Fork comes from a small glacial lake on one side of a meadow-like summit and at the base of a splendid mountain, a complex mass of rocky *arêtes* and hanging glaciers.

Upon further inquiry, we learned that the valley as it descended to

the north-west was blocked by a glacier that came into it, and beyond that a canyon, which made this route altogether out of the question. A high valley on the right, however, offered the last and only escape for us, and, after reaching an altitude of 8000 feet, our descent began into a valley that we knew must be either the Athabasca or Whirlpool river, which flows into it. Thus the most critical part of our expedition, the discovery of a pass from the Saskatchewan into the Athabasca, was safely accomplished. It is highly probable that ours is the first party to go over this route. Though now twenty-six days out from Laggan, we were only a little more than halfway to the Athabasca pass, but

CAMP SCENE IN CANYON OF NORTH FORK.

a description of that country would carry us beyond the subject in hand.

Owing to force of circumstances, it was not till late in the season of 1898 that I had an opportunity to visit the source of the Middle Fork of the Saskatchewan. For this trip I engaged as packer William Peyto, a man who had proved very efficient on previous expeditions; also a cook, and an outfit of nine horses.

It seemed almost foolhardy, when on October 12, against driving snow-showers and a cold wind, we set out from Laggan and once more pursued our toilsome march through the many miles of burnt timber northwards, as it were, into the very teeth of winter. Through constant snowstorms—for the headwaters of the Bow are a breeding-place for bad weather—we passed the upper Bow lake, the divide beyond, and got 6 miles down the Little Fork on the third day, as a result of forced

marches. During the following night there was a curious creaking sound of the tent-ropes and a sagging of the canvas, and in the morning our prospects for a successful trip were very gloomy indeed, with 10 inches of new snow on the ground. Not wishing, under these circumstances, to get further away from civilization, we remained in camp all day. By afternoon the snow ceased, and the next day we were again on the march. The snow was 15 inches deep in the Little Fork valley, but only half that amount near the Saskatchewan, which we reached on the sixth day.

On October 13 we crossed the Little Fork, and turned westwards into a region that promised to be full of interest. The weather, which had been cloudy and threatening for some days, now gave signs of improvement by the appearance of blue sky in the west, and soon after the high mountains up the Middle Fork were bathed in sunlight. The dazzling light on the snow-covered landscape was very cheering after the days of gloom and storm. The trail penetrates a forest on the south bank, and frequently coming on the river allows views of the wide log-strewn gravel-wash, the work of summer floods.

About 5 miles up the river a valley comes in from Glacier lake, and our camp was placed on a point of land between the confluent streams. The Saskatchewan at this cold season is clear as a mountain spring, and shallow enough to be fordable on foot. In summer, however, it is a raging flood that makes the region of Glacier lake very difficult to reach. From our camp I set out in the afternoon to see the lake, and found it in an hour, not without a hard scramble through deep snow and fallen timber. The view was well worth the labour expended. The lake, which is 3 or 4 miles long, is beautifully set among high peaks, and at the further end a snow-mountain sends down a glacier nearly to its level. The setting sun, sinking into a notch of the distant mountains, poured shafts of light through gray misty clouds and tinged their edges with a pale golden illumination. The lake was nearly calm, and reflected the beautiful picture of mountain and sky from a tremulously moving surface. The water, by retreating from its summer level, had exposed a wide margin of mud-covered boulders and slippery logs, the trunks of trees carried into the lake by snow-slides; but in the distance the forested banks seemed to press close upon the water. There was something wonderfully impressive in the isolation and awful solitude of such a grand scene under the spell of evening calm.

From what had been seen of the country, I decided that it was important to reach, if possible, the summit of a high mountain that lay to the east of the lake, which from its position would command a comprehensive view of the whole region, and also surely reveal Mount Forbes, which was somewhere west of the lake, according to Palliser's map.

Accordingly I was afoot the next morning at nine o'clock, with a

camera on shoulders ready for the ascent. The mountain appeared to be about 7800 feet in altitude, or, in round numbers, 3000 feet above our camp. The weather was bright and cold, nor was there a cloud in the sky, and it proved by far the best day of the trip. It appeared that the walking would be better on the other side of the Glacier lake stream, and after some ineffectual attempts to bridge the river by felling trees, Peyto carried me across on his back in a shallow place, and so the climb was commenced with dry boots. In less than five minutes a fine trail

FALL NEAR SOURCE OF NORTH FORK.

appeared, which saved a great deal of labour and considerable time in getting to the lake. The trail at length diverged to the east, towards the mountain, and went in the right direction till the altitude was 600 feet above the lake, at a great saving of energy in forcing a way through the underbush. The sunlight was painfully brilliant on the snow, which was fully a foot in depth at 7000 feet. At this altitude, in a last clump of spruce trees, I hung my camera to a branch and took a short rest, as the climb so far had been very exhausting.

After a pause of ten minutes, the sharp air urged a recommencement of the ascent. The brilliant glare of an hour previous had given place to a somewhat cloudy sky, as a belt of heavy cirrus was drifting along over the mountains in a great line running north and south. The sun shone through it feebly, and was surrounded by a halo. I soon began to have doubts of my ability to succeed in the ascent, as my strength began to fail under so much exertion in the deep snow. The bushes, rocks, and other inequalities of the ground were buried, so that I frequently stumbled and fell. Moreover, it now became apparent that the size of the mountain had been much underestimated, for the heights on the right rose tremendously even after an altitude of 7500 feet had been reached. The inclination was very steep, and the now returned sun on the vast expanse of snow, and the great height above anything to fasten the eyes upon for relief, gave a curious sensation of dizziness, due perhaps in part to exhaustion. I felt, however, the importance of reaching the summit, as it meant practically the success of the entire trip. Moreover, the extraordinarily fine weather on this the critical day of the trip seemed too providential to be lost from any lack of exertion or ambition.

Summoning, then, all my resolution, I made reasonable progress for a time, but soon, in spite of every eager desire for success and ambition to reach the summit, the contest between will-power and tired muscles became doubtful, as the snow grew deeper with higher altitude, the slope steeper, and the far-off summit seemed no nearer than ever. Every few yards of progress was invariably terminated by a fall in the snow, and it seemed better to rest for a moment in whatever position chance had it, than to get up at once.

A little later a view appeared that in itself well repaid the labour of the climb. On the right was an expanse of spotless snow, exceedingly steep, vast in extent, and dazzling in brilliancy. Its rounded contours were sharply outlined against the sky, but there was neither any interruption of stone or cliff in the monotonous covering of snow, nor any scale by which to judge of size or distance. The chief object of interest in the view was a snowy triangular peak covered with ice which now began to appear in the west. The colours of rocks and cliffs in the distant rocks and precipices seemed absolutely black in contrast with the remarkable whiteness of the snow surface on all sides. Overhead the sky was intensely blue, but marked by distinct wisps of white cirrus cloud, spun out like tufts of cotton into shreds and curving lines.

At an altitude of 8800 feet, or more than 4000 feet above our camp, I reached at length the summit of the mountain crest. It was necessary to walk along the crest a quarter of a mile to reach a somewhat higher point, which was the true summit. The snow along this mountain ridge was in many places 3 or 4 feet deep, and, mindful of the terrible alpine

accidents caused by cornices, I kept well away from the edge, below which it seemed to drop sheer several thousand feet. The snow was sparkling in the sun, and of the myriads of bright points about one-half were merely white light, like diamonds, the other half were either green, blue, or amber-coloured, like emeralds, sapphires, and topazes. From intense frost my gloves were frozen so stiff that notes and sketches had to be done with bare hands.

The most conspicuous and interesting part of the whole vast panorama was the lofty summit of Mount Forbes, beyond the valley of Glacier lake. Another mountain, about 10 miles to the west, and Mount

MOUNT FORBES, FROM ABOUT 9000 FEET.

Forbes were the two highest mountains in sight, and each are probably between 13,000 and 14,000 feet in altitude. Glaciers of very large size come from those mountains and terminate a few miles above the lake. The whole valley of the Saskatchewan to its upper end, and in the opposite direction many miles below the mouths of the North and Little Forks, was clearly visible. There was a very high rock peak in a group of mountains east of the Little Fork that occupied the position of Hector's Mount Murchison, which he calculated to be 13,600 feet high. This mountain is hidden away in a group that must be 75 miles in circumference, and so it is rarely seen. There was a fine view to the north, where a wild and desolate valley thousands of feet below was dominated by a castle-like mountain over 11,000 feet high, probably Mount Lyell, cut in ruins like ancient towers and battlements. Of four plates

exposed on this mountain, only one was successful, so that I had a narrow escape from failing altogether in getting a view of Mount Forbes, which, because of its great height, is veiled from view by clouds, and is frequently invisible for weeks at a time.

Thursday, October 20.—The day broke grey and unsettled, with the highest mountains touched by clouds. We continued our march up the Saskatchewan valley, and urged the horses rapidly over a level gravel plain at such speed as to make in all 10 miles. On the west side of the valley there is a stupendous wall of rock between 11,000 and 12,000 feet high, which terminates in the giant peak of Mount Forbes a little to the north. About 4 miles from our camping-place there is a group of curious rounded hills, rising like forested islands from the sea of gravel.

There was a strong raw wind against us, and, because of our water-soaked boots half frozen by contact with snow, it was altogether too cold to keep the saddle long, and every one walked most of the time. We made camp in a miserable place of stunted timber, half killed by gravel which had been washed over the region in some change of the river course not many years before. The river here divides into three streams: the smallest near our camp came from the Howse pass, less than 3 miles distant; the other two from a valley to the south-east, each, curiously enough, on opposite sides of a flat. In the afternoon, I walked some 3 miles up the valley to where the lesser stream turns in from the west, and, as it heads at the base of Mount Forbes, I followed it a mile or so further, till presently the current became rapid, the valley narrow, and the water closely hemmed in by rocky banks, so that the walking was very difficult. The snow was a foot deep in this little valley, where the sun and wind could not exert their influence as in the open. The stream on the other side of the valley is larger, and comes from a glacier several miles distant. This whole region was very thoroughly examined last summer by Messrs. Collie, Baker, and Stutfield, who not only explored the large glacier, which is supposed to be 10 or 15 miles long, but went up the other stream several miles to the base of Mount Forbes, in the hope of ascending it. The flood of waters that sweeps down here in summer from the long glacier has cut channels 3 or 4 feet deep, lined with immense boulders, across the whole bottom of the valley. This is the chief stream or source of the Saskatchewan.

During the night the wind came up in fitful gusts, the stars were no longer bright points, but foggy spots seen through a thin mist, bands of cloud swept along the mountain-sides almost as low as our camp, and at length the whole sky was overcast. The barometer was much lower at midnight. By one in the morning it began to snow, which was a cause for no little apprehension, as we were far from the railroad.

Friday, October 21.—The sky was still threatening, though very

little snow had fallen. We were on march a little after ten o'clock, and reached the summit of the Howse pass in an hour. This pass was made known to the traders of the North-West Fur Company by a man named Howes, or Hawes, about 1810, and was at one time much used by the Kootenay Indians, who came over the mountains and bartered with the fur-traders at a place about three days' journey down the Saskatchewan, now known from this circumstance as the Kootenay plain. This route is now impassable, as fire has run through the forests in the lower part of the Blaeberry valley, which leads to the Columbia river, and the timber has fallen for many miles. The pass itself is about 5300 feet in altitude, and about 18 miles from the Little Fork.

WINTER SCENE ON PASS BETWEEN BLAEBERRY AND KICKING HORSE RIVER.

At this point we were seven days' journey from the railroad by either one of two routes—the one we had come by, or another which, by going down the Blaeberry a day's march and then over a pass to the south-east, would bring us to a pass into the Kicking Horse river, and so to Field, in British Columbia, and the latter route seemed preferable, as it would be through a new region.

The descent into the Blaeberry is one of the most trying exploits that the mountains offer. We commenced to descend rapidly the channel of a brawling mountain torrent, crossing from side to side constantly, so that our horses were compelled to climb up and down steep banks,

to scramble over immense logs, or sometimes to force a way down the bowlder-strewn bed of the river. As there was no trail, Peyto had to lead in whatever way appeared best, and in several places our horses had to slide on their haunches down steep banks 40 or 50 feet high, jump into the torrent, cross it, and then ascend a similar bank on the other side at the greatest risk of accident, and to the no little trial of our nerves. After three hours of such labour we camped about 10 miles down the valley. It rained hard all night, turning to snow in the morning.

Saturday, October 22.—We followed a branch stream that comes in from the south-east for a mile or so, and then ascended 2600 feet without a trail through a heavy forest. The snow, which was hardly apparent in the Blaeberry valley, became 18 inches deep near the tree-line. Snow also fell at frequent intervals throughout the day and shut out the landscape, so that our bearings were mostly by compass. Almost at nightfall, and in desperation, we camped in the depths of a heavy forest on the mountain-side. The snow was very deep and the temperature low, so that it was all the harder for our horses, which had to be turned loose in the timber with no chance to feed. The heavily laden spruce trees sent down avalanches of snow at every stroke of the axe, so it was very difficult to keep our camp fire going, which was the more important as we had no other water except by melting snow.

Sunday, October 23.—The weather was still cold and threatening. It was very hard work packing up, as all the ropes, canvas covers, tents, and blankets were frozen stiff and covered with granular ice. Our horses looked very thin after their recent hard marches and little or no feed. They were hungry enough to bite off twigs and woody branches from the bushes which had a few buds on them. We did not get off till nearly noon, and then continued a traverse of the forested mountain-side with a constant gradual descent, in the hope of reaching a valley bottom that leads to the pass. We were no sooner started than a heavy snow-storm set in, shutting out everything from view. There was no trail, as the pass has never been used before this summer. In about two hours we reached a valley bottom that we supposed to be the right one, though Peyto, who had taken the only other party through that ever crossed this pass, did not recognize it for some time. The deep snow and the constant ascent were very trying to our famished horses. One or two of us went ahead all the time and broke trail for them, but in spite of this, some of our pack-animals lay down in the snow exhausted and groaned pitifully. We reached the summit at length, and camped half a mile beyond. The snow was now 24 inches deep on the level, and in the depressions of the ground it was between 3 and 4 feet. At this camp our horses got a little grass by pawing away the snow, a habit that they learn during the hard winters on the plains.

We were now at the head of the North Branch of the Kicking Horse

river, and it was practically a constant descent to Field, where we arrived in three days more, after having been out seventeen days. On this excursion every camp but the first was made on snow-covered ground, and there were only three days on which some snow did not fall. No small measure of our success was due to the splendid outfit of horses supplied me by Mr. T. E. Wilson, of Banff, who gave me the pick of his pack-animals. Very much depends on the training and strength of the horses in a rough country, where countless obstacles have to be conquered, fallen trees passed over, swamps and rivers crossed, the close-set mazes of deep forests penetrated, and a pathway carefully selected over the treacherous holes of loose rock-slides. To seize the exact hour or day amid the changes of fickle weather, the veiling smoke of forest fires, blinding snowstorms, that a particular journey or mountain ascent may be accomplished, rests in no small measure on the experience of the pack-horse, and it is a cause for little wonder that the traveller soon learns to take a certain pride in the faithful beasts which do service often at the sacrifice of their lives.

Speaking generally of the headwaters of the Saskatchewan, the valleys are well wooded, the mountains very high for this part of the Rockies, and large areas are covered by snow-fields or glaciers. The general character of the scenery is remarkably imposing, and unfailing in variety of mountain forms so long as the valleys are the point of view. When seen, however, from high summits there is a kind of sameness due to the fact that thousands of mountains are visible in the panorama, all quite uniform in height, among which the higher peaks that are 11,000 or 12,000 feet above sea-level are apparently lost.

All the larger streams come from glaciers, and consequently reach their highest stage during the hottest weather; their waters are turbid with glacial mud, and they undergo a daily rise by day when the sun melts the ice, and a daily fall at night when freezing commences. The region of the Middle Fork, especially near Glacier lake and the base of Mount Forbes, is one of the grandest and most imposing, not only in the Rockies, but possibly in any mountain region of the world, even when seen under gloomy skies and the desolate garb of winter. In this region are some of the highest mountains between Montana and Athabasca pass.

The forests, which clothe all the mountains up to a height of 7000 feet above sea-level, are chiefly of Engelmann's spruce and balsam fir, with occasional areas of jack pine. The beautiful Lyall's larch, characteristic of mountains farther south, was never seen in these valleys.

The summer season, which usually begins in June and lasts till September, is too short for extensive geographical work, so that much remains to be done in the way of exact measurement of mountains and glaciers. However, the very fact that travel among these mountains is still for the most part purely exploratory adds not a little to the pleasure of visiting a region of such unusual grandeur.

TRAVELS AND RESEARCHES IN RHODESIA.*

By HENRY SCHLICHTER, D.Sc.

When I left England a year and a half ago, the principal objects of my expedition were to examine the countries between the Limpopo and the Zambezi, in South-Eastern Africa, with reference to their geological and mineralogical features, their general geographical and ethnological

Route..... Railways ——

SKETCH-MAP OF MATABELELAND AND MASHONALAND, SHOWING SITES OF RUINS.

aspects, and last, not least, to examine the mysterious remnants of the ancient colonists, which had been previously investigated by my two predecessors in this respect, viz. Mauch and Bent.

My investigations led me right in the centre of Matabeleland and Mashonaland.

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* Read at the Royal Geographical Society, February 27, 1899.

I need hardly describe Bulawayo, as, owing to the opening of the Bulawayo railway, so many reports have appeared in books and periodicals, that everybody is acquainted with this town. But I must add that the railway (the terminus of which Bulawayo is) has in the course of the last fifteen months enormously altered the features of the town. Everywhere large buildings, avenues, etc., are coming into existence, and the activity of the mining districts, especially that of Selukwe, has given, and is still giving from day to day, a stimulus to the inhabitants of Bulawayo, who, in spite of many obstacles, have

BAOBAB TREE, INYANGA PLATEAU, NORTH-EASTERN MASHONALAND (ALTITUDE OF 5000 FEET).

with British tenacity, for more than five years, upheld their position as one of the furthest and most successful outposts of British civilization.

You might perhaps ask me to modify this statement, as Salisbury, which is 280 miles further to the north-east, is also a prominent centre of British enterprise, but I must point out that the railway connection with the south is the most important feature which has made Bulawayo what it is to-day. The same will soon be the case with Salisbury, as the indefatigable energy of Mr. Rhodes has already succeeded in pushing the East Coast railway from Beira within close proximity of Salisbury, which town will be reached by it in the course of the present year.

From Salisbury I started for Inyanga. It was due to Mr. Rhodes's

kindness, who provided me with an excellent guide, Mr. Pretorius, of Headlands, that I was able to cross from the main road between Salisbury and Umtali through the little-known territory north of Manica to the hardly explored district of Inyanga. Inyanga is decidedly the pearl of Mashonaland. I give my own impression, acquired there and then on the spot during my travels and stays of many weeks. From an agricultural and pastoral point of view these districts are excellent, and their climate is healthy in every respect.

The Inyanga plateaus extend towards the north for not less than 60 miles, whence they slope down to the valley of the Ruenya. I have twice traversed this whole district. Botanically, the mopani and sugar-bush formation further south changes into picturesque grassy plateaus, above which the enormous baobab trees, the giants of the African flora, tower up. I have since learned that this is a novel botanical feature, as so far baobab trees in Central South Africa have not been found in altitudes higher than 3500 feet; but as I marked in detail on my maps where I met them first, and as I have photographs of them, I am in a position to fully substantiate my statement. Moreover, they occur also on the high plateaus of the Matoko country in Regao's district. The lovely plains and valleys of Northern Inyanga are everywhere studded with them, while, wherever black soil appears, the traces of innumerable old negro cultivations, chiefly rice, are noticeable. But, strange to say, these lovely plateaus are in their northern parts entirely uninhabited. I have often queried my black followers with reference to this point. It appears that the reason is twofold. First, owing to the great elevation, the climate is, during the greater part of the year, too bleak for them; and, secondly, they all assert that there was, a considerable time ago, a big battle on these plateaus, and that they are afraid of the ghosts of the slain. The latter assertion is one which has a great influence upon their mind, as none of them, who happen to pass the district, omit to take all the necessary precautions, like stone-throwing, and so on, when they have to go across the dreaded plateaus.

But the district is also in other respects full of interesting relics of bygone times. First of all, there are innumerable old native workings, which indicate that once a very dense population occupied these plateaus. Hills after hills and mountains after mountains are literally covered with stone terraces, wall enclosures, etc., which were partly erected for defensive purposes, and partly because agricultural, or rather horticultural pursuits played a very important part in the mode of living of these Bantu tribes. These old cultivations do not belong to antiquity, and I have little doubt that we have to put them down to the well-known Monomotapa period several centuries ago.

But, apart from that, Inyanga is full of unmistakable indications

of a civilization many centuries older, and belonging to the Zimbabye period of antiquity, which is chiefly characterized by the mysterious Mashonaland ruins, concerning which we have had the late Mr. Bent's account seven years ago. There are hundreds of ancient forts and slave-pits, large aqueducts, and many traces of smelting furnaces, and extensive citadels, the last-named being used for defensive purposes against the surrounding mountain tribes.

Indications of the ancient Semitic stone and solar worship are numerous, and in one of the slave-pits of Inyanga I have discovered, on an old soapstone slab, the remnants of an inscription, which is undoubtedly of ancient Semitic origin.

MOUNT MARKHAM, FROM A DISTANCE OF ABOUT 20 MILES.

North of Inyanga these traces of an ancient civilization gradually disappear, but I should not like to leave it unmentioned that a little further west, in a big valley which is formed by the source rivers of the great Ruenya system, not only similar ancient remnants are numerous, but that there are quartz and other indications, proving that an extensive gold industry was carried on in olden times.

On the whole, these Inyanga plateaus are, as I have mentioned, 6000 feet high, but they gradually slope down towards the north, where, in the vicinity of Katerere's district, they descend towards the river system of the large and permanently flowing Ruenya, which runs from there towards the north to the Zambezi.

These high plateaus present splendid views over a very extensive part of the still unsufficiently explored country to the west, while towards the east the steep Inyanga mountains rise like an enormous natural wall. While marching through these districts day after day, hundreds of new peaks became visible, some of them of great altitude. There is one spot, 40 miles north of Mr. Rhodes's Inyanga settlement, where one of the most picturesque African panoramas exists. Mauch discovered and named two lofty granite mountains to the north of this spot, and called them Mount Moltke and Mount Bismarck. Both reach an altitude of about 9000 feet from sea-level. Towards the south-west I discovered what seemed to me two still higher mountains, which are, as far as my knowledge goes, without native names, and which I called Mount Markham and Mount Keltie.

Mount Markham is, as the photograph shows, a splendid double-peaked granite mountain; it belongs to the nearer districts of Northern Manica, west of Inyanga. Southward there is another characteristic mountain, also visible from the same spot, and which I passed several times, viz. Mount Umsenia. It is not as high as the other two, but presents a characteristic appearance, owing to its picturesque granite crest, extending over more than a couple of miles.

From Inyanga I went through the Kaiser Wilhelm I. district to Tete, on the Zambezi. The distance is 150 miles. The diagram (p. 376) shows you the course of the Ruenya river, ascertained as far as its junction with the Mazoe. I was greatly interested in finding that, at the junction of the Mazoe with the Ruenya, a large party of the Oceana Company was engaged in successfully washing alluvial gold. Tete itself is in a dilapidated state. The town made upon me the impression of a German town after the Thirty Years' War. There are at present only about twenty Europeans at Tete, and their hospitality is of the best kind.

The natives who occupy the districts north-west of Inyanga are totally different from the Mashonas. They are Matokos (or Mambujas), and a very fine race indeed. Warlike and proud, and many of them more than 6 feet high, they resemble more the Matabele than the degenerated Mashonas, whom they conquered about twenty-five years ago, when they immigrated into the country. This last-named statement I derived from the unpublished diaries of the late explorer, Carl Mauch, which are in my possession. His reports concerning the Matokos are of great interest to me. During the last rebellion the Matokos did not side with the Mashonas, although they share the common dislike of every proud tribe against foreign rule. I personally like these rough savages much better than I do degenerate tribes like the Mashonas and Makalakas. One of the principal reasons why I visited the Matoko country was that I expected to find extensive gold-fields

in the formations of the metamorphic schists and those above them, and I may just mention that my expectations were confirmed.

Let us now direct our attention to the important question of ancient colonizations in South Africa. When Mr. Bent returned, in the year 1892, from his journey to Zimbabye, he declared the Mashonaland ruins as buildings dating from a pre-Mohammedan period, and of ancient Semitic origin. A short time afterwards I gave in our *Geographical Journal* a series of reasons that these Mashonaland ruins date not only from a pre-Mohammedan time, but that they must have been built before the

ROUGH SUN IMAGE, CARVED ON DECORATED SOAPSTONE MONOLITH, ZIMBABYE.

commencement of the Christian era. I have at the same time pointed out the astronomical significance of the mural ornaments which are found everywhere on the more important ruins, and I have advocated the possibility that we might be able to ascertain the exact age of these highly interesting buildings by means of them. That was at the time of Bent's journey. Meanwhile the Zimbabye ruins have been further examined by Sir John Willoughby; many other finds have been made by various prospectors (some of the highest importance); and, finally, I have myself personally investigated not less than four of these ancient ruin districts, viz. Zimbabye itself, Manica, Inyanga, and the very important group of ancient ruins in the Mombo district of Matabeleland, which are in many respects even more interesting than Zimbabye itself.

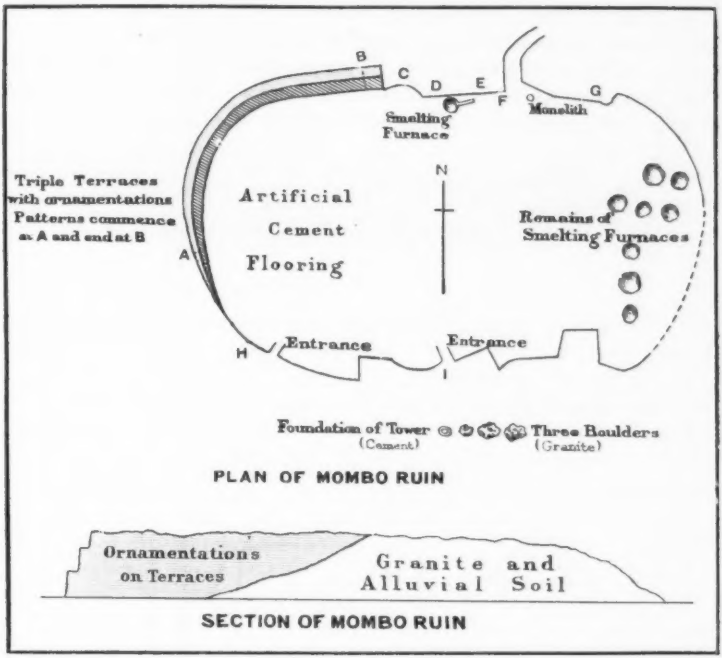
I will now deal with all these factors in the most concise fashion possible. One of the most remarkable finds is the Zimbabye Zodiac, which was found some miles from the Zimbabye ruins, and which is now in the possession of Mr. Rhodes, who was kind enough to let me examine it carefully. I am in a position to show you an excellent photograph of this most interesting document of pre-Christian time, which I have recently taken in Capetown. These zodiacal signs are represented on what I believe to be an offering-dish of very hard wood, which has been well preserved through all the centuries since the ancient colonists used it. The zodiacal pictures are such that they could not possibly have been made by African savages, while they coincide in every respect with other finds which Bent and others have made in Zimbabye. One of the pictures is an image of the sun analogous to the sun-pictures which Mauch and Bent found on the monoliths of Zimbabye, and analogous also to finds in Asia Minor, which belong to the Assyro-Babylonian period. And this image of the sun has its position directly behind the zodiacal image of the Taurus, and between the signs of the Taurus and the Gemini. But we know that in early antiquity the beginning of the year was represented by the zodiacal sign of Taurus. This was so firmly established (although not correct any longer at the later time of the Roman period) that even Virgil still sings—

"Candidus aureatis aperit cum cornibus annum *taurus*."

Therefore this position of the image of the sun on our Zimbabye Zodiac points directly to the early times of antiquity. But this interesting document furnishes us also with a second proof, because the centre of the offering-dish is represented by a crocodile, which, as Sir Norman Lockyer has proved, was frequently used in antiquity as representing the polar constellation of the northern hemisphere (compare Sir J. Norman Lockyer, 'The Dawn of Astronomy,' 1894, p. 150). Moreover, it is important that to this very day the Matokos show a similar crocodile worship to that which is described in Sir Norman Lockyer's just-mentioned book with reference to the crocodile and the hippopotamus. Furthermore, it is interesting to note that in ancient Egypt the symbol for the commencement of the year was the image of a hawk. This hawk was, as is very well known, likewise the symbol of Ra, the sun-god of the ancient Egyptians; and hawks were also worshipped in Zimbabye, as has been conclusively proved by Mauch, Bent, Posselt, and others.

All these various points show that there was an early connection between the Zimbabye colonists and the races of antiquity which practised solar worship and astronomy. That Zimbabye is of ancient Semitic or Egyptian origin can no longer be doubted, but I have further additional evidence to that effect.

In 1897, when I was at Inyanga, examining the numerous ancient slave-pits there, I was fortunate enough to discover what I believe to be an ancient inscription, of which several letters are still perfectly legible and well incised. It has an archaic and quaint



CENTRAL MOMBO RUIN.

ORNAMENTS ON TERRACE OF MOMBO RUINS.

Lowest Terrace.—Chess pattern.
Second „ „ .—Zimbabye ⋀⋀⋀ pattern (top); single herring-bone (////////) pattern (middle); chess pattern (below).
Upper Terrace.—Single herring-bone pattern (top); Zimbabye pattern (middle); chess pattern (below).

Ornaments at—

C Chess pattern (top); single herring-bone pattern (middle); double herring-bone pattern (<<<<<<<) (below).
D Two parallel rows of dark ironstone.
E One row single herring-bone pattern (\\\\\\\) (top); one row double herring-bone pattern (middle); four rows with chess pattern (below).
F A gap.
G Double herring-bone pattern (>>>>>>>); eight rows with chess pattern.
H Short double herring-bone pattern.
I Single herring-bone pattern (////////), ironstone pattern, near entrance.

The width from east to west (from terrace to smelting furnaces) is 135 feet; other distances are in the same proportion.

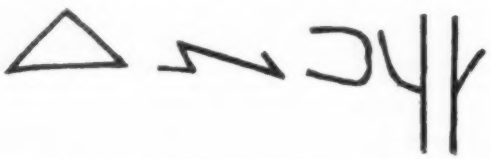
appearance, and I have already mentioned that it is of ancient Semitic origin.

In order to further investigate this problem, I have gone very carefully through the Old Testament, where the much-discussed trade

in gold-production, etc., in connection with the mysterious country of Ophir, is described. I was surprised to find that a number of direct analogies between Zimbabye and the early Israelitic worship exist. In the first instance, the treatment of the stones in Zimbabye, without chisels and other iron implements, which Bent and Willoughby pointed out, finds its direct confirmation in the old Judaic religion. Solomon's temple was likewise built of unhewn stones, and in two further passages we are told that the use of iron in the construction of worship places was considered a crime by the ancient Israelites. Moreover, it is interesting that in the Books of Kings, which were written about 600 years B.C.

SECTION OF PITS OF INYANCA

an old sacerdotal rhyme is found which dates undoubtedly from the tenth century B.C., and refers to a time in which, as we know through Prof. Wellhausen's investigations, the ancient Israelites were by no means addicted to the high and pure monotheistic worship which made their religion later on so infinitely superior to the worship of the surrounding nations. But at the time in question the Israelites were still addicted (as many passages of the Old Testament prove) to a solar and astral wor-

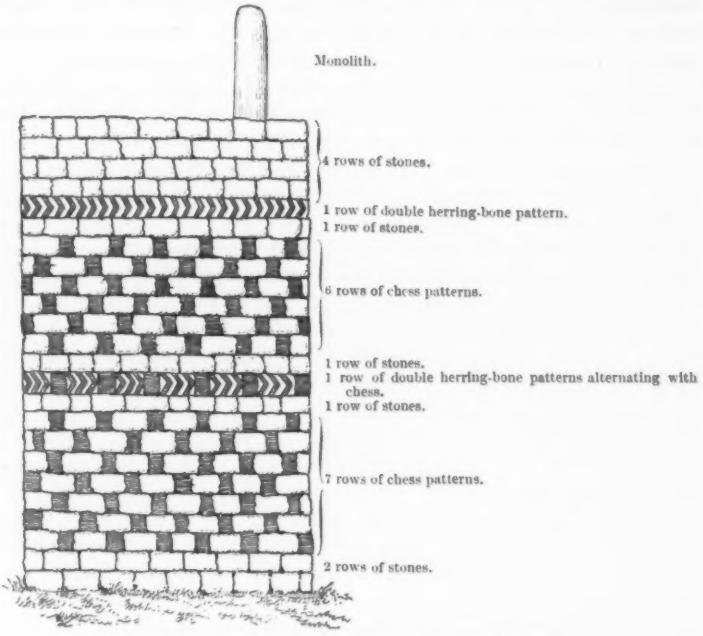


SUPPOSED ANCIENT SEMITIC INSCRIPTION FROM A SLAVE-PIT OF INYANGA. (ACTUAL SIZE).

ship, similar to that of the ancient Egyptians, Phœnicians, and Arabians. This important passage reads (according to Prof. Kautzsch's verbatim translation of the Book of Kings), "Jahweh placed the sun in the firmament of Heaven, but he said that he would dwell in darkness. Now, I have surely built Thee a house to dwell in, a settled place for Thee to abide in for ever." This is a direct analogy to the Zimbabye worship. There we have the same fact, viz. that the worship took place in the interior, and that the sacred enclosure was in the darkest part of the temple.

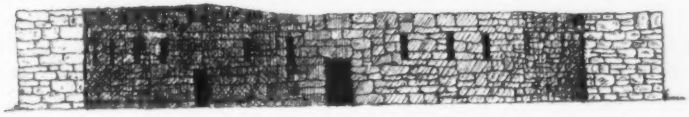
But this ancient Hebrew sacerdotal rhyme is still more characteristic in another respect. While in the year 600 B.C., when the First Book of Kings was written, this solar worship was still distinctly noticeable,

we have the characteristic fact before us that 300 years later, when the Judaic religion was far more advanced and refined, and already in its highest moral development, the "Chronicles" were written, which


Monolith.
4 rows of stones.
1 row of double herring-bone pattern.
1 row of stones.
6 rows of chess patterns.
1 row of stones.
1 row of double herring-bone patterns alternating with chess.
1 row of stones.
7 rows of chess patterns.
2 rows of stones.

WALL DECORATIONS AT THE MONOLITH, MOMBO RUINS.

are, as is well known, more or less a modified copy of the Book of Kings. And there we notice that the first verse of the sacerdotal rhyme just mentioned is suppressed, and that also the reference to the



SECTION OF OLD PORTUGUESE FORT, INYANGA.

dwelling of Jahweh is modified. This is in complete accordance with the enormous progress of the Judaic religion in the direction of the exalted monotheism which characterizes it. From what I have said, we see that, like many other indications belonging to the same period, the archaic and undeveloped Semitic worship of the Israelites was in close

connection with the solar worship of other members of the great Semitic family, including Phœnicians, Assyrians, Babylonians, etc. The analogy becomes still more interesting to those who believe in Prof. Wellhausen's interesting theory, who is of opinion that before the detailed Judaic code of worship was discovered in the year 623 B.C., solar and astral worship was everywhere practised among the ancient Israelites.

Very important for our subject-matter are, further, the analogies derived from Arabia. I have already shown in the *Geographical Journal* (July, 1893) that the Sabæans and other tribes of South-Western Arabia entertained close commercial relations with the territories on the East Coast of Africa. Moreover, it is interesting to note that the ancient Arabian religion was also analogous to the Zimbabye worship, being likewise a worship of the sun and other heavenly bodies. It is a further confirmation of what I have mentioned, that, according to Doughty's and Pietschmann's investigations, in North-Western Arabia ancient monuments exist which correspond to the Zimbabye constructions. There we have the same solid conical structures regularly composed of unhewn stones which we find at Zimbabye. The Arabs of to-day call these structures Riqûm. I paid particular attention to this point when I was at Zimbabye. I found that not only the large tower and the small tower in the great circular ruin, but also some of those on Zimbabye hill are absolutely analogous constructions. Carl Mauch has discovered another similar construction. The circular remnants of Matindela which Bent has examined are of a similar type. How far the ancient Phœnician Nuragen in Sardinia are connected with the Zimbabye constructions I will not decide at present, as they are beyond the sphere of my investigations, but I should not be surprised if we should find further connecting links; and I remember that the late Mr. Bent, in a discussion on this subject, mentioned to me that he had found something similar in Upper Egypt. Also the late Mr. Phillips, a well-known English trader in Matabeleland, stated, as far as my memory goes, that he found a similar monument more to the west in Matabeleland.

Summing up all these facts, we come to the conclusion that we have a Semitic cult of a very remote time before us. Bent remarks that he nowhere discovered burial-grounds or graves. But I have found, north of Inyanga, what I believe to be an extensive burial-ground. Owing to the absolute want of boys at the time being, I was unfortunately prevented from doing any excavation work thereon. It is a great pity that when, some time back, some prospectors of what is called "The Ancient Ruins Company" found a number of ancient graves and got out of them considerable quantities of gold, they did not keep the human skeletons which they found. Although I took the greatest trouble to ascertain details, I can only state, as far as my information goes, that the skulls were dolichocephalous.

Speaking about the period in which Zimbabye was built, I made on the spot the necessary measurements, which I have already explained in *Petermanns Mittheilungen* in the year 1892. My views, which I shall explain more in detail in a separate essay, were completely confirmed by the measurements. We have in Zimbabye an enormous gnomon before us, comprising a total angle of 120°. Taking all the details into account, I found that the obliquity of the ecliptic was somewhat more than 23° 52′, which brings us (considering that we have a good Chinese

ZIMBABYE DISH, SHOWING A NUMBER OF ZODIACAL AND OTHER ASTRONOMICAL SIGNS.

MEASUREMENTS:—Diameter, right to left, 14¼ inches; diameter, top to bottom, 13 inches; outside depth, 5¾ inches; inside depth, near centre, 2½ inches.

1. Gemini. 2. Empty space standing for Cancer (constellation introduced at a later period of antiquity). 3. Leo (?). 4. Virgo. 5. Libra. 6. Scorpio. 7. Milky Way (Sagittarius). 8. Capricornus (fish-tailed goat). 9. Aquarius. 10. Sun image. 11. Orion (hunter). 12. Taurus. The crocodile is taken to indicate the northern circumpolar constellation (compare Lockyer, "Dawn of Astronomy," 1894, p. 150).

observation of the same period) to a time somewhat 1100 B.C. for the erection of the Zimbabye ruins.

Let us now turn our attention to another important group of ruins. In the middle between Bulawayo and Gwelo, about 15 miles south of the main road, there is situated a group of ancient ruins which represents the Zimbabye of Matabeleland, and which is in several respects even more interesting than that of Mashonaland. These buildings have

been visited by prospectors, etc., before me, but no investigation of them has ever been made. In size these ruins (which I call, after the district in which they are situated, the *Mombo* ruins) are somewhat smaller than the Zimbabye temple, but in construction and ornamentation they are superior to it, and far more interesting than Zimbabye.

The Mombo ruins consist of a number of buildings, of which the central corresponds to the circular temple in Zimbabye, while the others are additional enclosures and fortifications. The central building is, from an architectural and astronomical point of view, the most interesting ruin south of the equator. The appearance of it is, as I have mentioned before, similar to the Zimbabye temple, but the difference between the two is (and I know no better comparison) that of an early Romanic basilica of simple feature compared with that of a cathedral of the most refined Gothic period. While we have on the outside wall of the Zimbabye temple only one astronomical pattern, and only a few indications of them on Zimbabye hill, the principal building of the Mombo ruins is literally covered with astronomical ornamentations. In spite of various gaps, I have counted not less than twenty-three different ornamentations of the best workmanship, and on a circular enclosure analogous to that which Mr. Bent has explored on the Lundi river there are another four ornamentations. It would occupy too much space to describe these patterns in detail. It is sufficient to say that among them are a number of ornamentations which I call Zimbabye patterns, because they are identical with the well-known ornamentation on the wall of the great Zimbabye temple.

The length of the central Mombo ruin (as far as the gaps allow to measure it) is 135 feet, and its average width 70 feet, and the whole appearance is (like Zimbabye) that of an ellipse. On the western side of the interior of this building is an extensive artificial platform of the same cement which is found in the interior of Zimbabye, but it has, different from the latter, a much greater elevation, in order to have a perfect view over the surrounding country. The northern portion of this central building is formed by three high terraces, beautifully executed, which abruptly end towards the true north. They are decorated with Zimbabye and other patterns. This arrangement, together with the platform, is analogous to the astronomical ornamentation of Zimbabye and Lundi.

The eastern part of the building consists of a number of smelting-furnaces, of the same cement as the platform. Most of these furnaces are partly destroyed, but I found one which is almost intact. South of the principal building are heaps of rubbish, where remnants of blowpipes, crucibles, and quartz are frequent, which can leave no doubt that gold-production was the object of the furnaces just described. We recognize, therefore, in these Mombo ruins, the identical features which my predecessors and myself have ascertained, viz. (1) solar worship,

(2) fortifications, and (3) gold-production. Moreover, I am fully convinced that the great number of different ornamentations, which the plan shows you, had, apart from solar worship, also to do with the observation of the principal planets and stars, but I was not in a position to spend the time necessary to investigate this point thoroughly.

As the platform from which the observations were taken is at present in a very dilapidated state, and as it will take weeks to mathematically arrange and discern the different patterns, while I had only days at my disposal, I considered it best to make as carefully as I could the plan of the building before you, and I hope that either somebody else or myself will soon be in a position to ascertain all these further details. This will not be difficult, as the Mombo ruins are easily accessible, being only a short distance from the main road between Bulawayo and Gwelo. A police camp is only 8 miles off, and the excellent farm and store of Mr. Rixon, who is known all over Matabeleland, is also in close proximity.

After all that I have explained, I should like to say a few words about the much-discussed question of Ophir. I am well aware that this name has a somewhat mysterious and unscientific sound. But this is unjustified. At the time when Lassen, Gesenius, Petermann, and others, discussed the Ophir question, it was from want of definite details that theories of a somewhat unscientific character were started, thus discrediting to a certain extent, in the course of the years, the whole problem. But nothing is more unjustified, because the basis of the whole Ophir problem, viz. the reports of the Old Testament, are in every respect reliable and well defined, and are, from a scientific point of view, just as good as the reports of Herodotus, Ptolemy, Pliny, and others. My first step in this direction was to examine at what time the various authors of the Old Testament have written their reports about Ophir, because it is evident that, at a time when the word Ophir was in everybody's mouth without any further explanation, the colony of Ophir could not possibly have been a matter of the past. The result is, that all the reports of the Old Testament were written in the period between 600 and 164 B.C.

With this fact we have gained a firm basis for the discussion whether Ophir was in India or Africa. Fortunately, the same period comprises the exploits of the man who first explored India, viz. Alexander the Great. Among his followers were many who would have collected news about a gold-belt in India, provided that the latter was actually existing. But no gold country whatever existed there; on the contrary, all Indian tribes were almost devoid of gold, and Arrianus, our best and most reliable source of information about the campaigns of Alexander the Great, states as emphatically as possible as follows:—

"Alexander and his army have refuted most of the stories in this direction, with the exception of some who have obviously made incorrect statements. It has thus been ascertained that all the Indians through

whose territories Alexander and his army marched (and he marched through many of them) have no gold." Therefore it is evident that India cannot possibly be the Ophir of antiquity.

Now, we know that, with regard to Ophir, only the coast countries of the Indian ocean can come into consideration, and Arabia and Equatorial East Africa have been mentioned in connection with the Ophir problem. But against this assumption stands the clear text of the three most reliable and oldest passages of the Old Testament, viz. 1 Kings, chap. ix. verses 26 to 28, and chap. x. verses 11 and 22. It is absolutely unintelligible to me how any one who compares these passages in a literal and critical translation (for instance, that by Prof. Kautsch) can assert that the passage in chap. x. verse 22 does not deal with Ophir, as it is most emphatically stated that we have to deal with a sea navigation which extended to remote countries—in fact, to the end of the then known world, and it is therefore clear that this gold land of antiquity could neither have been on the coast of the Red sea nor on that of Equatorial Africa or Arabia. To what extent, however, the Arabians, especially the Sabæans, were engaged and interested in the trade with Ophir, I have shown in some of my previous publications, and it would lead too far to repeat it here.

Summing up, we have the following facts:—

(1) An inscription of undoubtedly ancient Semitic characters.

(2) Zimbabye was built at about 1100 B.C.

(3) A Phœnician and Judaic trade with Ophir is proved to have been in existence (to take the narrowest limits) between 950 and 850 B.C.

(4) Between 600 and 164 B.C. more than a dozen reports referring to Ophir are in existence in the Old Testament, and Ophir is used in them as a household word.

(5) The fact that Alexander found no gold-belt in India.

(6) Herodotus, during the same period, describes furthest Ethiopia as one of the most extensive gold-producing centres in the ancient world.

These are the facts, and I will on the present occasion abstain from drawing more detailed conclusions.

One thing, however, appears to me to be established beyond doubt, through the investigations of Mauch, Bent, and myself, viz. that the territories known to-day as Southern Rhodesia were, 1000 years before the commencement of the Christian era, a gold-producing country of a large extent, and *colonized by the early Semitic races round the Red Sea, viz. by Jews, Phœnicians, and Western Arabians.* The Rhodesia ruins are the first discovered traces of an "Old World" civilization on the southern hemisphere, and they form, as already Carl Ritter expressed it, one of the most interesting links between ancient and modern geography.

In conclusion, I may refer to three old Portuguese fortifications which I found in the northern part of Inyanga; of one of them I made a detailed plan and measurements. The illustration of the section of

this fortification shows that these constructions are totally different from the old Semitic ruins, as well as from the Monomotapa Kafir constructions. The existence of these Portuguese forts proves the correctness of the old Portuguese writers of the sixteenth and seventeenth century, who asserted that the early Portuguese dominions extended far into the interior of South Africa south of the Zambezi.

Before the reading of the paper, the PRESIDENT said: We have this evening with us an old friend, who will not read a paper here for the first time—Dr. Schlichter. That reminds me also how much cause we have to lament the loss of Mr. Theodore Bent, and I am glad to say Dr. Schlichter has just told me that, after going over the ground and examining the ruins discovered, as you will remember, by Mr. Bent not many years ago, he can bear testimony to the accuracy of his work, both as regards observations and measurements, and I think I am not far wrong in saying that it was owing to the interest that he took in a paper by Mr. Bent that Dr. Schlichter resolved to attempt to continue his work by further examinations of this country and the interesting ruins to be found there. I now call upon Dr. Schlichter to read his paper.

After the reading of the paper, the following discussion took place:—

Mr. F. C. SELOUS: I am sure we have all listened to Dr. Schlichter's paper with very great interest, for it dealt with a most fascinating subject, namely, the history of a country which, having been once developed to a certain extent by one of the most energetic peoples of ancient times, subsequently lapsed into a state of barbarism, but is now again, thanks to the energy and enterprise of Cecil Rhodes, once more on the threshold of a further and infinitely greater development. I have always discriminated, in speaking and writing of Rhodesia, between the high and healthy plateaux and the lowlying parts of the country in the valleys of the Zambezi and the Limpopo, and I still adhere to what I have always said, that these high plateaux are as good a country as is to be found in South Africa. Without taking the gold into consideration at all, I believe that these plateaux are suitable for European occupation, and possess a climate in which white men will grow up strong and healthy, and I therefore consider that these portions of Rhodesia have a great future before them. It would be very presumptuous on my part, as I have no scientific knowledge whatever, were I to attempt to criticize any of Dr. Schlichter's views concerning the antiquity of the ancient ruins in Mashonaland; but besides the ancient ruins, he also spoke of certain stone walls, which had been built by the Bantu tribes, whose descendants are now living in the country.

Now, the two principal arts known to the ancient people appear to have been the art of building walls of stone bricks carefully fitted together without mortar, and the art of extracting gold from quartz reefs, and I think it is generally considered that these two arts died out in South-Eastern Africa a very long time ago, at the time when the ancient people who first introduced them into the country are supposed to have been swept off the face of the Earth in some catastrophe—possibly a rising of the aboriginal races, during which they and their civilization died together. But I believe that there is an intimate connection between the Bantu tribes now inhabiting South-Eastern Africa and the ancient Semitic people who first built temples and extracted gold from quartz in that country. Not only did the extraction of gold from quartz not become a lost art a very long time ago, but we have overwhelming evidence that it has been continually practised down to quite recent times by the immediate ancestors of the present Bantu tribes, and

was only discontinued on account of the Zulu invasions into Mashonaland, which have taken place during the present century. Old men who accompanied Umziligazi on his first incursion into the country we now call Rhodesia about sixty years ago have repeatedly told me that they found the "Amaholi," as they termed the native inhabitants of the country, working in the "amaguti"—that is, in the deep holes—the old workings which have recently been found by Europeans on quartz reefs all over the country. In 1891, too, Mr. Kock, a prospector, found a bucket and rope made of "machabel" bark, at the bottom of a shaft 120 feet deep on a reef near the Umzweswi river. Articles made of such perishable materials could not have been very old, and they had obviously been used to haul up quartz from the bottom of the shaft. Mr. Kock also found several iron implements at the bottom of this shaft, identical with those used by the natives of Mashonaland at the present day. In 1884, too, I visited, with Mr. S. H. Edwards, the mouth of an old shaft filled up with *débris* in Western Matabeleland. By the side of the shaft was a heap of quartz, which had evidently been burnt and stacked ready for crushing, and by the side of this heap of quartz lay several of the hard round stones with which the natives used to crush it before extracting the gold. The burnt quartz, after having been broken into little pieces, was laid little by little on a large flat stone, and ground fine with a large round stone. The gold was then washed out of it and melted into small ingots in clay crucibles. On opening up the shaft I have just spoken of, we found that in one part the roof had been supported by stout poles of "mapani" wood (the common wood of the country). These poles I examined carefully, and found that they all had their bark on, and showed no sign of great age, and had, moreover, all been chopped with the same kind of narrow-bladed axes which the natives use at the present time. In my own mind I feel sure that work at this mine, and at others in the same district, only ceased about sixty years ago, when the Matabele first invaded the country. But the extraction of gold from quartz was an industry carried on in eastern Mashonaland at a much later date than that. The testimony of Mr. Thomas Baines, the well-known traveller and artist, is incontestable on this point. He found the Mashonas extracting gold from hard quartz reefs in the neighbourhood of Lo Magondi's (about 70 miles north-west of the present town of Salisbury) as late as 1870. You will find a full account of this experience in Mr. Baines's book, the 'Gold Regions of South-East Africa.' To get gold-bearing quartz from a hard reef, the Mashonas first lighted fires against the hard rock, and then perhaps threw water on it, and they were then able to pick out pieces with their little axes. These pieces of quartz were then stacked amongst piles of firewood and roasted, and afterwards the burnt quartz was crushed and the gold washed out of it. Thus you will see that the art of extracting gold from quartz, which was first introduced into South-East Africa by a people of Semitic race—as Dr. Schlichter considers—some three thousand years ago, has endured in that country until quite recent times.

So, too, with the art of building stone walls. That art had gradually deteriorated from the time of the building of the great temple of Zimbabwe, but it was only abandoned quite recently. All over Makoni's and Mangwendi's countries, there is no doubt that the people went on building good stone walls round their villages and terracing the sides of some of the hills—their huts being built on the level terraces—until, in about 1820, their territories were overrun by the Gaza Zulus under Manikos. They then found out that their walls were but an inefficient protection against their fierce and well-organized assailants, and so gradually gave up building them. But there is abundant evidence—though it becomes every day more difficult to obtain—that it was the Zulu and Swazi incursions into the

countries lying between the Limpopo and the Zambezi which put an end to the arts of wall-building and extracting gold from quartz in South-East Africa. I have a theory of my own to account for the close connection which I believe undoubtedly exists between the ancient Semitic people who built the temple of Zimbabwe and the present Bantu tribes living in South-East Africa. I imagine that the ancient discoverers of Mashonaland came from some part of Arabia. They were doubtless a race of energetic traders, and, after having made their way into the interior, must have found the country rich in gold and ivory—the two things they were in search of. Having found what they were looking for, they probably formed settlements, and these settlements probably endured a very long time. But there were no P. and O. steamers in those days, nor had the Beira railway been built, so that travelling must have been rough and uncomfortable, so I should fancy that the ancient gold-seekers took none of their own women with them from Arabia, but intermarried very freely with the aboriginal black races of South-East Africa. Should this surmise be correct, there would, in course of time, have been a very considerable infusion of Semitic blood amongst the Bantu tribes, though if all intercourse after a time came to an end between Mashonaland and Arabia, owing to wars or revolutions, the more cultured Semitic people would gradually have become fused and lost amongst the more numerous aboriginal races. That there is a strain of some other blood than the negro in the Bantu peoples, I feel sure. You cannot go into any Bantu village in South-East Africa without noticing the difference of types amongst the people. Some are purely negroid, with thick lips, broad flat noses, and bent shin-bones; whilst others have very well formed heads and limbs, and good—even aquiline—features. And I have noticed that when you see a man in South-East Africa with good features, they are usually correlated with a light-coloured skin, and I take it that the blood of the ancient Semitic people still exists in a much greater quantity among the Bantu people than is generally supposed.

There is not much time, I am afraid, for any further comments. Coming to the present history of Mashonaland, and to show you how unreliable native reports are apt to be, I may mention that, although, according to Dr. Schlichter, Herr Mauch was told by Matoko's people in 1870 that they had only lately invaded the country in which they were then living, and had migrated from the north-west, they told me quite a different story in 1890. In that year I visited Matoko, on behalf of the British South Africa Company, and had many long conversations with him and his sons, and also with many of the elders of his people. They all told me that they and their people had been living in the country—the same district where Mauch found them—from time immemorial, and pointed out to me the sites of many old villages, from which their people had been driven by the Abagaza under their chief Manikos, in the early part of this century. Now, which version is correct? Personally, I am sure that that told to me is, as there are a great many facts which corroborate it. I quite agree with Dr. Schlichter that the Mambujas (Matoko's people) are, in physical and general appearance, a much finer people than the generality of the tribes living in Mashonaland; but I don't think with him that they are a different race of people. Their language is the same as that spoken by all the non-Zulu peoples of South-East Africa, or, rather, it is one of the many dialects of one main language; nor do they dress differently or use different arms. I look upon them as one of the many small tribes now known generically as Mashonas; but as they were never actually conquered and habitually tyrannized over by any Zulu tribe, they have maintained all their old customs intact, and their independence of bearing.

Dr. Schlichter mentioned that Matoko's people did not take part in the recent

rebellion against the white people. But in this they were not singular, for none of the Mashonas living to the south and south-east of Matabeleland, that is, Gutu's people or the tribes ruled over by Chibi, Chilimanzi, and several other chiefs, took any part in the rebellion, except to actively assist the whites against the Matabele. I remember the Rev. Mr. Mackenzie, when speaking of the rebellion, said that the Mashonas must have been most brutally treated by the British South Africa Company, to prefer the rule of the Matabele to that of the whites; but Mr. Mackenzie could never have been correctly informed about the whole history of the rebellion, or he would have known that the greater part of the Mashonas who rebelled—the people of Makoni and Mangwendi, for instance—had never had anything to do with the Matabele, whilst all those Mashona tribes which, having lived along the southern and south-eastern border of Matabeleland, had been constantly subject to the grinding tyranny of the Matabele, not only did not join with that tribe against the white men, but gave their active assistance to the latter. Neither did the Makalakas join the Matabele in the late rebellion, thus showing that, like many of the Mashona tribes, they preferred the rule of the white men to that of Lobengula. I will not now say anything more, as it is getting so late, and there are others who may wish to take part in the discussion.

Mr. RAVENSTEIN: It is so very late, and this is so complicated a question, that I must confine my remarks to a very few words. Dr. Schlichter has placed so many interesting facts before us, that I am sure none of us will go home without having learned something. When these ruins were first heard of three hundred years ago, the Portuguese at once jumped to the conclusion that this must be Ophir, and it must be a source of satisfaction to the spirits of De Barros and others to have their views so confirmed. I will only say to-night we ought to be cautious, for this question of Ophir has already given us a lot of trouble, and it is likely to give more. I certainly hope that, so far as Rhodesia is concerned, all expectations may be realized; but as for the identification of the ruins, that is quite a different matter. It cannot matter the least to Mr. Rhodes, or any one else, whether this is the genuine Ophir or not, so long as the gold is genuine. I will only add that I believe we are a little rash in jumping to the conclusion that a Semitic people must have built those prehistoric structures. The temples, no doubt, pointed to sun-worship and the worship of the linga, and such temples, no doubt, are common enough in Southern Arabia, but they are also common to other parts of the world—they are common more especially in India, and I should like to see the claims of India properly considered in this respect.

We know that succeeding waves of civilization swept across Africa. We know there was a Semitic wave in Africa; Abyssinia proves this, and if that country is not wholly Semitic, the traces of Semitic influence are there and extend far beyond. But down the East Coast, the people of India were certainly before the Arabs, and so were the Malays. We have the Malays in Madagascar, although I don't suggest that they were the builders, but why not the Indians? We know, as a fact, that the Indians had an earlier and better knowledge of the Indian ocean and the East Coast of Africa than either the Greeks or Romans or Arabs. The Indians had very ancient maps, the information on which has been used by the Arabs. They had names for islands which were only known to the Arabs by report.

Colonel Sir THOMAS HOLDICH: It is much too late to enter into any lengthened discussion. There is, however, one question I should like to ask—Why should India be condemned as a country that holds no gold? I have a good many friends who have reason to hope otherwise, and who will consider this a most disturbing assertion. We know that one of the great difficulties with which

gold-mining operations in India have to contend, is that there are ancient workings in India in the Wynaad, in the Kolar district, Mysore, and in the basin of the Mahanuddy river, and that these workings are driven so deep that it is difficult to drive any further.

Out of them an immense amount of gold must at one time or another have been extracted, and I believe myself that even before the days of Alexander, to which Dr. Schlichter referred, gold was largely found and used in India. I believe, in fact, although no statement as to the existence of gold is made by any of Alexander's historians, yet that I am geologically correct in saying every single river in the Punjab holds gold, except perhaps the Beas.*

Dr. SCHLICHTER: It is too late to enter into any details now, and I will only say a few words. Mr. Selous is perfectly correct. I was surprised, and did not first believe it possible, that there could be so striking a difference between the Semitic and the purely African types. It is astonishing to see two distinct types, the Semitic and the African, in the same village. With regard to the burnt quartz crushings, I have seen them in various places in Northern Manica, and so I can

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* Had there been time I should have liked to add the following remarks to the above:—

"The evidences that exist of the mediæval occupation of countries lying between India and Africa by Arabs seem rather to support Dr. Schlichter's contention that the African ruins are of Arabic or Semitic origin. Although I have come across no traces of Arab occupation on the coasts of Persia, or in Makran, that are *clearly* pre-Mohammedan, it is historically certain that the Arabs were present in large numbers, both in Sistan and Makran (probably also in India) long before their invasion of Sind, which took place early in the eighth century A.D. It was the Arab governor of Makran who helped Mahomed Kassim through that country to the Indian frontier, so that the Arabs were probably dominant there by the end of the seventh century. A prominent feature of that invasion was the support of the invading army by the fleet, which conveyed the engines of war to be used against the walls of Debal in the Indian delta. The existence of such a fleet implies that the Arabs had long been navigators of the Eastern seas before that time; indeed, we must reckon many centuries to be necessary for the development of a fleet of that nature. Nor is there any reason to suppose that the Arabs were not as early navigators as the Phœnicians (who appear to have originated on the coast of Arabia) or the Greeks. By the time that Vasco da Gama rounded the Cape, the Arabs were able to take latitude observations by using the astrolabe, and could get their longitude from observations of the moon's eclipse, and they had learnt the use of the compass from the Chinese, whilst they apparently borrowed their system of notation from India. I have always suspected Vasco da Gama of having trusted entirely to Arab pilots to find his way to India. That the Arabs were the first astronomers and the earliest navigators is, I think, also supported by the fact that all the early ocean-going ships of Europe were built on the lines of the Arab 'buggalow;' many of our naval terms are Arabic (such as 'admiral,' 'barge,' 'dinghy,' and even 'jolly-boat'), and the names of the constellations are also Arabic. If the Arabs were not the first navigators, they obviously invented their own system of navigation, and borrowed it from no one. There is absolutely no evidence that I know of supporting the idea that the Indians crossed to Africa from India. The Aryans never were sailors. The Dravidians (notably the Telingas) certainly were, but they went eastward to Burmah and the straits, and formed settlements there, and not in the west. On the other hand, the position of the coast Arab city of Tiz, in Makran (which I have explored), and of others on the south coast of Arabia, almost proves the existence of a very ancient trade along the east coast of Africa, a theory which is certainly strongly supported by the evidence of the 'Periplus of the Erythræan sea,' which is supposed to have been written five centuries before the rise of the prophet in Arabia."—T. H. H.

fully corroborate what Mr. Selous states. As far as the mixed races are concerned, it is a question difficult to decide, as also the question of the connection between the Mashonas and Matokos, and I hope Mr. Selous will kindly excuse my not going into this complicated question now, owing to want of time. Mr. Ravenstein has correctly pointed out that there was always an Arabian intercourse with East Africa, but I think he is not quite correct in saying the old Arabian writers do not refer to Ophir. For instance, I think Masudi, one of the oldest Arabian writers in the ninth or tenth century, distinctly mentions South-East Africa and Sofala or Sophara.

As far as the Indians are concerned, I doubt whether they navigated the Indian ocean further than the coast of Arabia. There is no record before Hippalus that any one crossed the ocean.

I have no desire to force Ophir into Africa, but I have overwhelming evidence, so far as I can see, against India, and I can assure Sir Thomas Holdich that I have studied all the reports carefully. I have come to the conclusion that all the arguments are in favour of Africa and against India. Of course there remains a third factor, *i.e.* that Ophir was an emporium in the vicinity of the Red Sea, where the commerce all flowed together. Against that we have the distinct words of the Old Testament that it was a long sea-navigation. I hope these arguments will be discussed fully at some time, and if I have contributed something towards bringing the question of Ophir on to a scientific basis, I shall be glad.

The PRESIDENT: This is not the first time that Dr. Schlichter has addressed us. He read a very interesting paper on the names given by Ptolemy on the East Coast of Africa, which led to an animated discussion not a great many years ago, and Fellows of this Society will have seen his writings in the *Journal*, and that he has paid great attention, not only to comparative geography, but also to the photographing of lunar distances, which I believe he has had opportunities of practising himself lately.

I am sure, as there is no longer any time to discuss the question of Ophir, you will wish me to convey to Dr. Schlichter your unanimous vote of thanks for his very interesting paper and for the illustrations he has shown us.

THE INFLUENCE OF THE 'TRAVELS OF MARCO POLO' ON JACOBO GASTALDI'S MAPS OF ASIA.

By Baron A. E. NORDENSKJÖLD.

AT present about eighty more or less reliable ancient manuscripts are extant of the 'Travels of Marco Polo,' these being in Latin, Italian, or French, and since 1477 numerous editions of the work have been issued in most of the civilized languages of Europe.

Under such circumstances, it might well be imagined that the description of these travels would have exercised considerable influence on the development of cartography, and that both hand-drawn and printed maps of the travels and discoveries of Marco Polo would accompany the many manuscripts and printed editions. This, however, is not the case, even if some names, mentioned by Marco Polo, or some specially attractive inscriptions from the 'Travels' had crept into some

96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114
LA DESCRITTIONE DELLA PRIMA PARTE DELL' ASIA.
Con i nomi antichi & moderni.
Di Jacopo Gastaldi Piemontese cosmografo.
Comincia questa uerso Oriente al regno di Tarsé alla prouincia di Charaßam, di Sablestam, al regno di Cabul' et alla prouincia di Guzarate: da Occidente ha il suo principio al Stretto di Constantinopoli: uerso Settentrione alla prouincia di Seuora, & Sibiera: da Mezzo giorno al mar Roßo, et al golfo di Persia, con la prouincia di Circam nella quale si comprendono, la maggior parta de paesi, che poßiedono il prencipe dé Turchi & il Re Sophi. i confini dé quali qui si distinguono con piccioli punti et in tal modo parimente si diuidono i circonuicini parsi dá regni sopradetti. graduate in longitudine, & latitudine citta, castella, monti, fiumi, golfi, porti, capi, et isole misurate ogni distantia con miglia Italiane. Restituita da Antonio Lafreri.
L'ANNO ∞ D LXI.
50 100 150 200 250 300 350 400 450 500
Scala de miglia Italiani
Jacobus Bassius belga, incidebat.
Lucuby
Serban
SIR
Eillach
Chesoliti
TVRCHESTAN
REGI
ZAGATAI
TARTARI
Cauabusi
Caracus
Chesel
Cant
Otterra
RENACHER
Giend
Siminan
PRO
Paganse
Saluna
Teras

TITLE VIGNETTE OF PRIMA PARTE DELL' ASIA. SIZE 0·9 OF ORIGINAL.

of the maps of the fourteenth, fifteenth, and sixteenth centuries; *e.g.* in Atlas Catalane, in Fra Mauro's planisphere, in some of 'Tabulæ Novæ,' in the Italian edition of Ptolemy, which was published in Venetia in 1548. At all events, neither Ramusio, Zurla, Baldelli, Bürck, Yule, nor, as far as I know, any other of the many learned men who have devoted their attention to the discoveries of Marco Polo, have been able to refer to any maps in which all or almost all those places mentioned by Marco Polo are given.

All friends of the history of geography will therefore be glad to hear that such an atlas from the middle of the sixteenth century really does exist, viz. Gastaldi's 'Prima, seconda e terza parte dell' Asia.'

These maps have certainly been cited now and again, *e.g.* in Carlo Castellani's 'Catalogo delle opere Geographiche del Collegio Romano' (Roma, 1876), in 'Catalogue of the Maps in the British Museum,' 1885, in 'Facsimile Atlas and Periplus,' and in the last-mentioned work they are carefully reproduced in phototype, but hitherto their significance as regards the Marco Polo investigations has been completely ignored.

From the original at present in my collection I here reproduce in zincotype the complete title-vignettes of the maps.* They are beautiful copper-plates, rich in names. The size of the originals is: Tabula prima dell' Asia, 0·733 × 0·430; Tabula seconda dell' Asia, 0·746 × 0·475; and Tabula terza dell' Asia, 0·733 × 0·635. This last-mentioned leaf consists of two connected parts, the upper being 0·733 × 0·479, the lower 0·733 × 0·156, all in metres. These maps are all reproduced in 'Periplus,' Plates LIV., LV., and LVI., almost in full size.

There are two specially printed leaves which belong to the two maps first mentioned, viz.—

(1) "I nomi antichi et moderni della prima parte della Asia . . . de Giacobo de Gastaldi † Piamontese Cosmografo." Beneath: "In Venetia 1564. Con gratia et privilegio dell' Illustriss. Senato di Venetia per Anni 15." One leaf in folio. Size in metres of the text, 0·390 × 0·293.

(2) "I nomi antichi et moderni della seconda parte dell' Asia Di Giacomo di Castaldi Piamontese Cosmographo in Venetia 1564." Beneath: "Con gratia et privilegio del Summo Pontifice Papa Pio quarto per Anni X. Et dal Serenissimo Senato di Venetia per Anni XV." One leaf in folio. Size in metres of the text, 0·409 × 0·282.

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* As is usually the case with Italian maps engraved in copper of the sixteenth century, it is probable that these maps were almost simultaneously engraved on copper several times. At any rate, in 'Manno and Promis Notizie di Jacopo Gastaldi' ("Atti della R. Accademia delle Scienze di Torino," vol. xvi. 1881), an edition of 'Il disegno della prima parte dell' Asia 1559, Fabio Licinio f.' is cited. This edition, or impression, which in all probability differs but slightly from the print of 1561, I have not seen.

† As will be observed, Gastaldi's Christian and surname are both written differently in these copies. The learned cosmographer can therefore scarcely have himself superintended the reproduction of his work by the printing-press, or else, like so many learned and other men from the fifteenth and sixteenth centuries, felt indifferent as regards the orthography of his own name.

IL DISEGNO DELLA SECONDA PARTE DELL'ASIA
Il quale principia da leuante al fiume indo gia detto indo, et alla prouintia de malabar. e da Ponente il fiume Nilo, e parte luochi diserti da settentrione il Parallelo ch'e in 16 gradi di larghezza. et dall'Austro il mare d' india, et il fiume di magadazo, et il Regno de Deleguanze: Nel dello di segno si uedeno tutte le Scale che fanno le nauc, che Vano e Vengano con le Speciarie, dalla citta de calecut, et similmente tutti iluochi per terra nominati al presente, ch' uano e uengono le carouane dal Suachen. e Dalacca paese del pvele giouani, et similmẽte da Aden e ormus et dalla Bassara castello sopra il fiume frat: tutto graduato in Longezza e larghezza, et misurato con miglia italiane:
All' ill^mo sig^r il sig^r Marcho fucharo, Barone di Kirchberg e d' Waissenhoren:-
Giacomo di Castaldi Piamontese cosmographo in Venetia:- 1561
Con gratia et priuilegio del Sũmo Pontifice Papa Pio iiij p anni x
E del serenissimo Senato di Venetia per Anni XV
Fabio Licinio f.
350
700
400
500
miglia. 100 italiani.
92 93 94 95 96 97 98 99 100 101 102 103 104 105

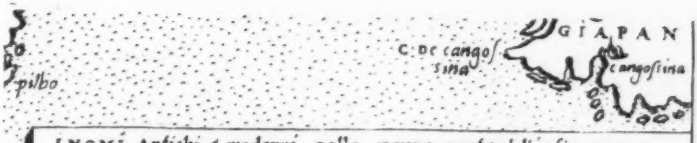
TITLE VIGNETTE OF SECUNDA PARTE DELL' ASIA. SIZE 0·9 OF ORIGINAL.

To the third map there is no special leaf with "nomi antichi e moderni." Instead there is a short list of names printed on the right margin of the map. The list of names embraces but a small number of the names given in the maps, viz. only those names of the day for which Gastaldi believed he could refer to synonyms in Ptolemy, Pliny, Solinus, etc. Among modern names occurring in them and identified with names in classical works, as instances let me cite Scutari Volga, Don, Bachu, Lassa, Buccara, Cabul, Guzarate, Aden, Decan Altay, etc.

In his three maps Gastaldi presents us with the first maps of that part of Asia that is south of Siberia. They are rich in names, and evidently founded on real observations, though the observations are often incorrectly interpreted. It forms a worthy sidepiece to Gastaldi's monumental map of Africa of 1564, drawn on eight leaves (compare 'Periplus, p. 130 and Plate XLVI.), which has been equally ignored by the investigators of the cartographical history of Africa as those maps which I am now discussing.

In 'Asia' the names along the coast and on the islands are taken from the Portulans and the voyages of discovery made by the Portuguese and Spaniards during the earlier part of the sixteenth century. The names quoted by Marco Polo occur here, though with several exceptions. But in the interior of Asia, from Mesopotamia to the Pacific, we find almost all those names which are used in the description of Marco Polo's travels, and with an orthography which, barring some few systematic alterations, is identical with that used in Ramusio's celebrated 'Delle Navigationi e Viaggi.' One preface written by Ramusio for this work is dated 1553. The second part, in which an account is given of Polo's travels, was first printed in 1559. I have used the edition, 'Venetia, Apresso T. Giunti, 1583.'

In the following table (p. 402) I submit a comparison between the names of places in Gastaldi's map and in the account of Polo's travels, according to the text of Ramusio. So as to extend the comparison to other original documents concerning Marco Polo, I must refer the reader to "Variantes et tableau comparatif des noms propres et des noms des lieux; cités dans les Voyages de Marco Polo," inserted pp. 533–552 in Malte-Brun, 'Recueil de Voyages et de Mémoires publié par la Société de Géographie,' i. ('Voyages de Marco Polo:' Paris, 1827). In this "tableau," all proper names from eleven different manuscripts are given. The difference of orthography is not very striking. Not one of the manuscripts here compared, whether in Latin, French, or Italian, so entirely coincides with Gastaldi's maps as the text published by Ramusio.



INOMI Antichi & moderni della terza parte dell' Asia perme
Giacomo di castaldi piamontese cosmographo in venetia
1561

Nomi Antichi	Nomi Moderni
ARIACES·SADINOR·	DECAN REGIONE
Asiacapra	campanir
Aurea Regia	malaca Regal
Auzacia	Ezina
Arisobin regia	Aua regal
Aratiacgia sora	Bisnagar regal
Bambala	Berinian
Barbari	Bermet
Barace insula	Babulcul isola e forteza
Barygaza	Bacain
Bēda riu ostia	Bēda riu e castello
Balipalna	Balicala
Baracura	Bacala
Barabonna	Bocao
Baracata insula	Basis isola
Banfic' riu	Costan riu
Balan casarea	Baicudel
Calligicu	Nigapalam
chaberis	calapate
Cosamba	Saligan
Corindur	Corchider
Cmanc	Chaul
callicaris	Cananor
carenura	calecut
cottara	cochin
Comaria promō	capo comari
Calchi	canamcina
Cory prmō	capo canamcina
Curula	Coloran
Calacosryla	Carteuo
Coddura	Gandauari
Carticardamma	Caligan
Cannagara	Cauchian
chrysoana riu ostia	Capumo riu
Cōs	Calantar
Calligara	Canton
Caurana	Cannu
Carnasa	Calaisascer
Canagora	Canaga
Dunga	Dabul
Gangis riu ostia	Ganga riu
Gange Regia	Bengala Regol
GANGETICO SINVS	GOLFO DE BENGALA
Corys riu ostia	Goa riu e castello
Hippocura	Onor
HIPPADIS PELA	ARCIPELAGO DE
CVS INSVLARV	MALDIVAR
indus riu ostia	Indus riu
Iscedon scythica	Succair
Iscedon serica	Cambalu
imans mōt	Altay mōte
Mandagara	Mangalor
Minagara	Macique patan

Nomi Antichi	Nomi Moderni
Madura regia pādiona	Bisnagar regal
Mitrigarii insula	Manolé isola
Melange	Malipur dove il corpo de s. tomaso apostolo
Manarpha	paleacate
Malæi colē promō	Capo cimapola
Marmera	Maylahah
Margara	Mogran
Nitria	Nelichilan
Nisama	Nicapatan
Nagaraque il rio nysopolis	March
Orthura Regio tornacis	Orisia regal
Ozene regia Tiastan	pate Regal
Ortophania	Rotaz
Poluro	Poluro
Perincori	Pelagonga
Peperine insula	Quelpchea isola
Patala	Pelagal
Podoperura	Pandarane
Pecura	Penacote
Perimula	Palane
Pagrasa	Perperi
Palonda	Pan
Piede	paida
Paliona	Pancomia
REGIO AVREA	REGNO DEMALAGA
Rarasia	Bacang
Sosicura	Iacamcuri
Sippara	Visnagapatan
syrastra uis'	Surat
Susiana	Samnat
Simylla	Sinfacora
Saburar	Sadrapatan
SABARACO·SIN'	GOLFO SAVOLAS
Seda	Sedoc
Sambra	Arracan
Sipa riu ostia	Ana Fiu
Sara	Solungo
Sobanni riu ostia	Sian altri Mena fiu
SINARVN	LACHINA
SCYTHIÆ EXTRA IMAV	TANGVT. PROVINTIA
Sorla	Singui
SERICANA PRO·	CATAYO PROVI·
Sera	Serra
Tilogrammō	Catigan
Trimesia insula	Resiche isola
Tricadeba insula	Quelpea isola
Thellyr	Triminocar
Temāla promō	Capo Nigral
Tecola	Tanay
Triglypton Regio	Pegu Regal
Tugma Regia	Vcima Regel
Thoana	Taigin
Thogara	Togara

COMPARATIVE LIST OF NAMES IN TERZA PARTE DELL' ASIA. SIZE 0·9 OF ORIGINAL.

TABLE OF GEOGRAPHICAL NAMES.

Ramusio's 'Marco Polo.'	*Gastaldi's 'Asia.'*
Soldadia *	Soldaia
Bolgara	Bulgar
Assara	Sara
Ouchacha	
Bocara	Buccara
Tripoli	Tripoli
Clemenfu	
Corazan	Corasan
Armenia minore / Armenia maggiore	Armenia
Giazza	Laiazo
Cogno	Cogna
Cayssaria	Caraisar
Sevasta	Seuastro
Arcingan	Arzingan
Argiron	Erzerum ?
Darzizi	
Paipurth	Baiburt
Zorzania	Giorgiani Regi
Trabisonda	Trebesonda
Tauris	Tauris
Mar Maggiore	Mar Maggiore
Abaccu †	Mare de Bacu
Geluchalat	
Tiflis	Tiflis
Moxul	Mosul
Mus	Mus
Meridin	Merdin
Baldach overo Bagadet	Bagdet
Babilonia	Babilonia
Balsara ‡	Balsara
Jasdi	Jessed ?
Chiermain	Chirman
Camandu	
Reobarle	
Balaxan	Badagsan
Chesmur	Chesmur
Malabar	Malabar
Dely	Delli
Consalmi	
Ormus	Ormus
Cobinam	Cobinan
Timochaim	Timochan
Damasco	Damascho
Sapurgan	Sapurgan
Balach	Balch
Thaican	
Scassem	
Balaxiam (quiui si . . . trouano quelle pietre pretiose, che si chiamano Balassi) §	(qui se trouano i balassi)
Bascia	Basiar
Vochan	
Pamer pianura	
Beloro	
Cascar	Cascar
Samarchan	Samarchand
Carchan	Iarchen
Cotam	Cotan
Peym	Poin
Ciarcian	Ciarcian
Lop	Lop
Ouchah	
Tanguth	Tangut
Sachion	Sachion
Chamul	Camul
Chiuchitalas	Chinchitalas
Succuir (si truoua Reubarbaro perfettissimo . . .)	Succuir (qui nasce il vero riobarbaro)
Campion	Canpion

* Some common geographical names, as also names of places beyond the boundaries of Gastaldi's map, are omitted.

† Four of the rivers given by Marco Polo as falling into Mare de Bacu (Herdil Geichon, Cur, Araz) are not discoverable in Gastaldi's map with those names. More recent sources have evidently been accessible to the cosmographer.

‡ The names of the six kingdoms into which, according to Marco Polo, Persia was divided, are here omitted. Probably Gastaldi deemed they belonged to a time long since disappeared.

§ I here cite only a few of the many descriptive legends which occur in the maps, and are borrowed from the account of Marco Polo's travels.

Ezina	Ezina
Carchoran	Caracoran (in three places)
Altay	Monti Altai
Bargu	Barcu
Erginul (in questa contrata si truoua il piu nobile e fino muscio)	Erginul (qui nasce il vero muscio)
Singui (Jui si trouano molti buoi saluatichi il quali sono della grandezza quasi de gl' Elephanti)	Singui (qui ui sono buoi grandissimi come Elefanti)
Egrigaia	Agrigaia
Calacia	Calatia
Tenduc	Tendich
Cianganor	Sianganor
Xandu	Xandu
Cambalu	Canbalu
Ungut	
Taigu	Taidu
Pulisangan	Puluisangu
Gouza	Gouza
Tainfu	Tainfu
Pianfu	Painfu
Taigin	Taigin
Caramoran	Coromoran
Cacianfu	Cacinfu
Quensanfu	Quensanfu
Cataio	Cataio
Mangi	Mangi
Sindinfu	Sindinfu
Thebeth	Tebet
Caindu	Caindu
Caraian	Caraia
Jaci	Jacy
Carazan (Nascono in questi paesi grandissimi serpenti, etc.).	Carazan (. . . qui ui sono serpe' grandisime . . .)
Vociam	Vociam
Mien	Mein
Bangala	Bengala
Cangigu	Cangigu
Amu	
Tholoman	Toloma
Cintigui	Cintinguy
Sidinfu	Sindinfu
Gingui	Gingui
Pazanfu	Pazanfu
Cianglu	Cianglu
Ciangli	Ciangli
Tudinfu	Tudinfu
Singuimatu	Singuimatu
Coiganzu	Coiganzu
Quanzu	Guanzu
Paughin	Paughin
Caim	
Tingui	Tingui
Cingui	
Jangui	
Nanghin	Nangui
Saianfu	Saianfu
Quian	Quian
Cayngui	
Cianghianfu	Cinghianfu
Tinguigui	Tinguigui
Vguiu	Vguy
Quinsay	Quinsay
Tapinzu	Tapinzu
Gengui	Zengiu
Zengian	Zangia
Concha	
Fugiu	Fungui
Gieza	
Quelinfu	Quelinfu
Unguem	Unguen
Cangiu	Cangiu
Zaithum	Zaiton
Zipangu	Giapan
Zorza	
Mare detto Cin	Mare della China
Cheinan	Cheinam
Ziamba	
Giaua	Giava
Sandur	Sondaru
Condur	Condur
Lochac	
Pentan	
Malaiur	
Felech	Felech
Basma	Basma
Samara	Simara
Dragoian	Dragoian
Lambri	Lambri
Fanfur	Farsur
Nocueran	Nocueran
Angaman	Angaman
Zeilan	Zeilan
Malabar	Malabar
Murphili ouero Monsul	

Lac ouero Loac e Lar *	
Cael	Calle
Coulam	Coulan
Cumari	Comari
Guzerat	Guzzarate
Canam	
Cambaia	Cambaia
Seruenath (Semenath)	Samnat
Chesmacoran	Chichmecran
Soccotera	Zocotora
Abascia	
Adem	Adem
Escier	
Dulfar	Dolfar
Calaiati	Calayate

The above list of names includes almost all the names of places in Ramusio's 'Marco Polo' of those regions embraced by Gastaldi's maps, as also the corresponding denominations of Gastaldi's atlas, as far as I could find them out. As is obvious, the agreement is so complete, with but few exceptions, that there can be no doubt that the atlas, as regards Central Asia and China, is either directly founded on Ramusio's edition of 'Marco Polo,' which was printed but a few years previous to that with which the maps, or rather the copper-plates thereof are dated, or else that both works are founded on a common older original document. The latter theory seems more probable to me. In its favour there are the many names not to be found in Ramusio. Ramusio gives also (ii., folio 18*a*) from a manuscript of Albufeda (Signor Abilfada Ismaël), the geographical longitude and latitude of thirty-one places, of which many occur on the maps in question, but in very different spots from that demanded by Albufeda's determinations of their positions. Gastaldi has chiefly consulted other, probably later, sources for his fine drawing, so rich in names, of Arabia and the Indian peninsula, as also for the sketch of the archipelago of Eastern Asia, and this is a proof of how difficult it then was for a cosmographer to bring about any agreement between Ptolemy's maps of South-Eastern Asia, the accounts of Marco Polo, and the "modern" discoveries, a difficulty which even now is scarcely entirely overcome.

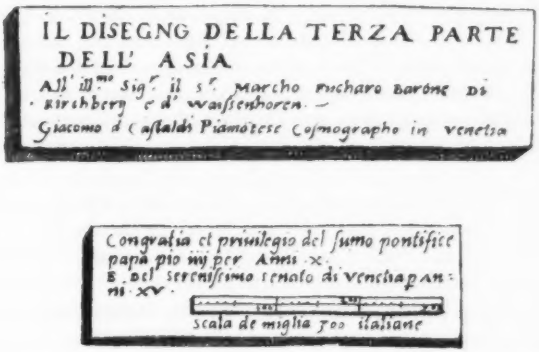
When studying these maps, it must not be overlooked that only a small portion of the names of places are to be found in Marco Polo, and that those parts of Asia which are not touched on in the account of his travels, are as rich in names as the rest of the maps. All names, however, keep

* The names Loac, Murfili, Pentam I have been unable to discover in Gastaldi's maps, but they occur, as also some few others from Marco Polo, in 'Tabula moderna Indiæ Orientalis' and 'Tabula Superioris Indiæ et Tartariæ Majoris;' in Ptolemy, 'Argentorati' (1522) (Facsimile Atlas, Figs. 62 and 63, pp. 99 and 101). In some other older maps these names, or variations thereof, are also to be found, more especially Murfili. The reason why this place has attracted more attention than others is doubtless owing to the tale of Murfili being so rich in diamonds, and the manner of collecting these stones from inaccessible abysses by throwing down pieces of meat to which the diamonds become attached, and which were fetched up by large birds of prey. In all probability Gastaldi has ascertained that the account was pure fiction, and therefore omitted to put down the formerly popular name on his map.

precisely the same style of orthography. For the most part they retain the decided local stamp of the various countries. Many occur for the first time in cartography, and not a few are easily identified as names existing on the maps of the present day.

A remarkable circumstance is that Lake Aral is neither mentioned by Marco Polo nor entered on Gastaldi's map, if this great lake be not meant by a very small lake, Saluna lago, placed east of the Caspian, and by the river Chesel (present Kizil?) connected with that sea.

Farther to the south there is a large river system mapped out, formed by Abia, Amu, and several other branches of a river, which,


IL DISEGNO DELLA TERZA PARTE
DELL' ASIA
All' ill.mo sig.r il s.r Marcho Fucharo barone di
Kirchberg e d' Wainsenhorn
Giacomo di Castaldi Piamontese Cosmographo in Venetia
Con gratia et privilegio del sumo pontifice
papa pio iiij per Anni x.
E del serenissimo senato di Venetia per an:
ni xv.
scala de miglia 700 italiane

TITLE VIGNETTES OF TERZA PARTE DELL' ASIA. SIZE 0·9 OF ORIGINALS.

after having become united, is called Abiamu, and discharges itself into the Caspian. This is probably the first time that the river Amu (Daria) has been entered in a map under any recognizable denomination.

It seems, therefore, that Gastaldi had access to other accounts of travels in Upper Asia, China, India, etc., than those of Marco Polo. There is little improbability in this when we remember that simply a fortunate incident—imprisonment by the Genoese and the company of a talented man and clever scribe as his fellow-prisoner—has preserved for us the adventures of Marco Polo. It is possible that, besides those accounts of travels* mentioned in geographical literature, other information anent the superfluity of Oriental goods of every kind, the dangers threatening Europe from that quarter, and the prospect of extending

* Among modern works, in which mediæval accounts of travels in Upper Asia and China have been compared, and in which good references have been given to the extensive literature pertaining to this subject, let me mention the following: Henry Yule, 'Cathay and the Way thither: being a Collection of Mediæval Notices of China,' 2 vols. (Hakluyt Society: London, 1866); Yule, 'The Book of Sir Marco Polo' (London, 1875); Henri Cordier, 'Les Voyages en Asie au XIV. siècle du Bienheureux Frère Odoric de Pordenone' (Paris, 1891), etc.

in those Eastern lands the sphere of Christianity, had accumulated in the archives of Venice and Rome, and been placed at the disposal of the designers of the maps. As a good friend of Ramusio, the secretary of the Decemvirate, and as a helper of the illustrious Franco-Roman engraver Lafreri, the cosmographer Gastaldi was just the right man to whom such confidence might be shown. The dedication of 'Seconda' and 'Terza parte dell' Asia' to Marcus Fugger (Marco Fuchero), moreover, makes it probable that Gastaldi has also had access to the valuable archives of this family. Finally, it must be remembered that Gastaldi, under the guidance of Ramusio, is supposed to have aided in repairing or repainting the famous wall-maps in Sala dello scudo in Venice (compare Baldelli Boni, 'Il Millione di Marco Polo,' p. cvi. (Firenze, 1827); 'Periplus,' p. 141). If such was the case, it may be considered probable that the monumental maps of Africa and Asia by Gastaldi have had some connection with this work, *i.e.* that these copper-plate engravings are a reproduction of the originals of the wall-maps in that form which was given them in the middle of the sixteenth century.

Whether this be true or not, from what I have already adduced, it is plain that these maps from the middle of the sixteenth century are of great interest and well worth a careful monographic investigation. Many important and novel lights might be thrown on the geographical history of Africa, Upper Asia, China, the two Indian peninsulas, and Arabia. As the original engravings are extremely rare, I must again remind the reader that they are reproduced in phototype (Africa, Plate XLVI.; Asia, Plate LIV.–LVI.) in my work published simultaneously in Swedish and in English, entitled 'Periplus: an Essay on the Early History of Charts and Sailing Directions' (Stockholm, 1897).

THE GERMAN ANTARCTIC EXPEDITION.

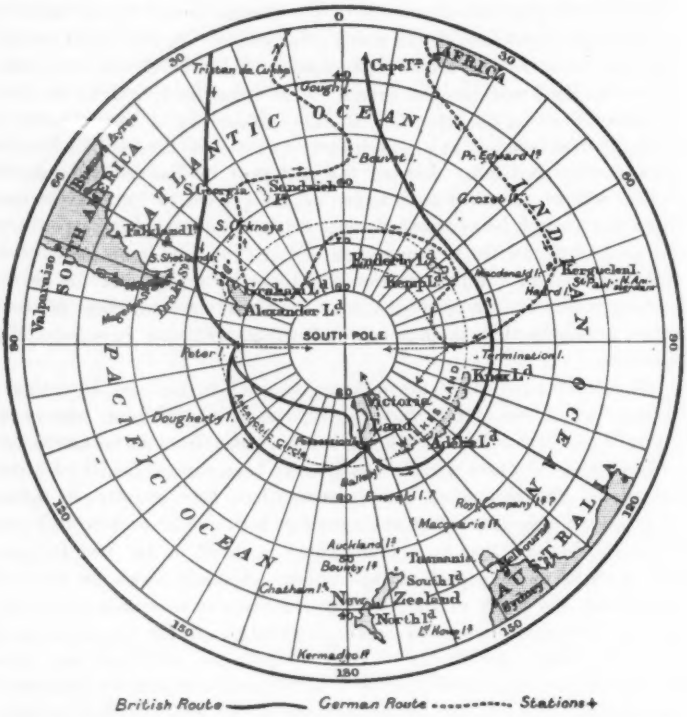
A LARGE and enthusiastic meeting was held in Berlin on January 16, in support of the projected German Antarctic Expedition, under the joint auspices of the Berlin Geographical Society and the Berlin-Charlottenburg branch of the German Colonial Society. In addition to the members of these two societies, the audience included a number of distinguished visitors, present by special invitation, while a message was received from the German Emperor, expressing regret at his inability to be present in person, and his sympathy with the objects of the meeting. These were, principally, the exposition of the aims and plan of the proposed expedition before the more influential circles of the capital, with a view to securing the needed Government support for the undertaking. The results are said to have been most encouraging, and the

interest aroused in all quarters is such that it is confidently expected that all remaining difficulties will be overcome, and that the expedition will sail during the course of next year.

Baron von Richthofen, who presided as representing the older of the two societies, opened the proceedings by describing briefly the history of the project, which, as our readers are aware, has been under discussion since the Bremen meeting of the German Geographentag in 1895, when Dr. Neumayer's untiring advocacy of antarctic research attained its first practical success by the recognition of the advisability of a national expedition to the south polar region. A year ago a further step was taken by the selection, as leader, of Dr. Erich von Drygalski, whose excellent work on the inland ice of Greenland, both in the form of observations on the spot and in the working up of the material at home, pointed him out as pre-eminently qualified to direct the scientific work of the expedition. During the past year he has devoted himself to the task of arousing an interest in the project in various German cities, but though he everywhere met with an encouraging response, it was evident that without Government aid the required funds (calculated at somewhat over a million marks) could not be raised, and the recent meeting was therefore resolved upon. As already stated, there is every reason to believe that the financial difficulties will now be successfully overcome.

The chief interest of the meeting centred in Dr. von Drygalski's address, which set forth, with great clearness, the past history of antarctic research, the advantages to be gained from an antarctic expedition, and the plans which have already been formed for its practical execution. The aims of antarctic research have been so fully put before the public in this country at the meetings both at our own Society and the Royal Society, that it is unnecessary to dwell on Dr. von Drygalski's remarks on this part of the subject. He laid stress on the fact that it was the work of the German mathematician Gauss which, by showing the importance of magnetic observations in the far south, gave rise to the three expeditions of D'Urville, Wilkes, and Ross, and thus led indirectly to the acquisition of most of the knowledge we possess of that region; and also on the importance of the geographical problem awaiting solution, as shown by the fact that every new research has, unlike those in the arctic region, given more and more confirmation of the old idea that a continent does exist within the antarctic circle. As regards the programme already sketched out, the speaker pointed out the great importance of co-operation with the proposed English expedition, and his remarks should act as a stimulus to further exertion on the part of our countrymen, and lead to a determination that such an important national undertaking shall not be allowed to fall through from lack of funds. Sir Clements Markham's demonstration of the gains to be expected in the direction of practical nautical training and the

maintenance of national prestige were fully endorsed by Dr. von Drygalski, and this alone should arouse the interest of those to whom the scientific results may not appeal so nearly. The route of the German expedition has been so chosen—primarily, indeed, on other grounds—as to fit in with the hints which have been thrown out in this country as to the probable sphere of action of a British expedition, the meridian of Kerguelen's land being mentioned as the most favourable line of



British Route ——— German Route ---------- Stations +

SUGGESTED ROUTES OF GERMAN AND BRITISH ANTARCTIC EXPEDITIONS.

advance towards the great unknown region. Dr. von Drygalski explained that the great quantities of drift-ice which have been met with in the Southern ocean during the past few years (since 1891) renders it likely that the ice-barrier will, at the present time, present unusually small obstacles to an advance, and as during the latter part of that period (since 1894) the Southern Indian ocean has been particularly marked by the abundance of such ice, the line recommended would seem to present greater advantages than any other. Supposing it possible to

advance in this direction, and that a coast-line should be reached within the antarctic circle somewhat to the west of Knox Land, a winter station would be established near the margin of the ice-sheet, regular scientific operations being carried out throughout that season, while in the spring an advance over the ice in the direction of the south pole and the southern magnetic pole would be attempted. For many reasons it is considered unnecessary that the expedition should consist of more than one ship, which must be of wood on account of the magnetic observations. The voyages of the *Vega* and *Fram* have shown that success may be attained with a single ship, and though additional results might be obtained by the employment of a second, to follow an independent route, these may equally well—and it is thought with less delay—be gained through international co-operation. The ship will be constructed with a special view to sea-worthiness, rendered imperative by the stormy nature of the Southern ocean; the lines of the *Fram* cannot therefore be adopted, and the risks arising from ice-pressure (less in the south than in the north, by reason that the currents all trend *outwards*) must be guarded against by strengthening of the internal structure. It is needless to add that the German undertaking has our cordial sympathy, and it can only be hoped once more that the expected co-operation on the part of this country may not be looked for in vain.

In connection with this account, the following extract from a letter from Baron von Richthofen, President of the Berlin Geographical Society, to Sir Clements Markham, President R.G.S., is of special interest:—

"The question of antarctic exploration will, of course, take a prominent place (at the International Geographical Congress at Berlin in September). It would be a great thing if we were able to discuss the objects of co-operative action of two firmly established expeditions.

"As regards the German expedition, matters are now advancing very satisfactorily. The three most important powers—the Government, the Reichstag, and public opinion—are favourable to the scheme. We had here a successful meeting on its account. I send you a copy of the proceedings, although you may have got one by Drygalski, who is the moving spirit in the matter.

"In these proceedings you will find it repeatedly expressed as our particular desire that, in order to multiply the value of scientific work, chiefly with regard to magnetism and meteorology, the synchronous co-operation with the British expedition be firmly secured. I would, therefore, be thankful to you if you would kindly let me know how your prospects are progressing, and it would give all of us here great satisfaction if you could give favourable news.

"Although we have adopted the plan of but one vessel, an antarctic expedition cannot be carried out without a considerable expense in money and individual energy. The desire must therefore prevail to

render its results as effective as possible, and it is certain that they will be greatly enhanced if a second expedition is working simultaneously on the other side of the pole.

"You would greatly oblige me by an early reply, and I hope it will be favourable."

LAKE CHOGA AND SURROUNDING COUNTRY.*

By the late Captain R. T. KIRKPATRICK, D.S.O.

THE lake is shallow for the most part; soundings varied from 2 to 3 fathoms. Patches of papyrus are scattered about, and in the shallower parts lotus and weeds of many kinds are abundant. Five or six miles east of Kaweri island the lake runs into marshy country with channels and stretches of open water; it is hard to say where it ends exactly. Except where hills are actually shown, the shores of the lake are flat, and there is usually a fringe of papyrus 10 to 50 yards wide.

The north shore is thickly wooded, as are also Gabula, Milondo, and Kagwara. The trees are mainly euphorbia, and two or three varieties of acacia. Drawing a line north and south through Kaweri island, the country east of this line is much more open, and all, both wooded and open, seems rich. There are many villages and paths, and the country south of the lake is thickly populated.

Heights of hills above the level of the lake :—

Pegi hill	800 feet.	
Hill on Kaweri island	350 „	
Hill west of Naiko hill	600 „	
Naiko hill	1000 „	(estimated).
Ungera hill	1500 „	„

The Wakedi live round the northern, eastern, and south-eastern shores of the lake. Kakunguru, the Kaganda chief who accompanied us, said those on the northern shore were hostile, and we could not land without a fight; we did not land or see anything of them. We found those on the southern shore perfectly friendly, and exchanged presents with Kenaga, chief of Msara, the chief of Sabot, and Tende, chief of Kahera. They have no tribal chief, and these men are only chiefs of villages. The men are of good height, 5 feet 7 inches to 5 feet 10 inches, slightly built, and wiry. They wear as ornaments shells, beads, brass wire

* This report from the late Captain Kirkpatrick was received after the sad news of his death, when with Colonel Macdonald's expedition on the Nile to the east of Dufile. Colonel Macdonald and his staff have done a great amount of new geographical work during the trying operations in which they have been engaged. On Colonel Macdonald's return we hope to receive a full account of this work, to accompany the maps which have been sent home. Meantime, out of respect to Captain Kirkpatrick's memory, it has been considered right to publish this report along with the map to which it refers.—Ed. *G. J.* Map, p. 464.

round the neck, and bracelets of brass wire and ivory. Most of them wear skins or a little bark cloth round the waist, but some are quite naked. They carry spears. The women wear a string of beads round the waist, and a little skin hanging down in front, besides the usual ornaments. As a race, they have not the thick lips or flat noses which mark the negroid type, and are, in fact, less like the typical negro than are the Waganda. They keep cattle, and grow wimbi, metammeh, semsem, sweet potatoes, and bananas. Food is plentiful and cheap; two fowls could be bought for a brass cartridge-case. Their huts are circular, made of wattle and daub, and have grass roofs built in stages like the roof of a Burmese pagoda. They store their grain in circular constructions, like a large bowl, of wattle and daub, raised on piles and thatched. Their cattle are kept in enclosures of growing cactus. They make dug-out canoes with knives.

The Wadope live on Kaweri and Namlimoka islands. They have the Wakedi language, and all the remarks already made about the Wakedi apply to them. They are, I think, Wakedi who, through living on islands, have got separated from the main body of the tribe. They are, however, somewhat more muscular than the Wakedi, probably owing to the amount of work they do in their canoes. They catch fish with baited hooks set like night-lines. Kakunguru has a fort on Kaweri island, and says he is their chief. He says there are about two hundred men on the island. Most of them wear bark cloth obtained from the Waganda.

Northern Usoga to the south of Lake Choga is very flat and closely wooded. There is a fairly thick population, and bananas, sheep, and fowls are plentiful and very cheap. In Gabula there are villages of Wakedi and Wanyoro as well as Wasoga; the three races do not intermarry. About 25 miles north of Lubwa's the country becomes more hilly, and the elephant grass, so familiar in Uganda, takes the place of trees to a great extent. The population also becomes denser.

Rounds of angles were taken from Pegi hill, the hill on Kaweri island, a rock near Msara, the hill west of Naiko hill, and a rock near Ngo. The instrument used was a large prismatic compass with a stand, of which the variation had been ascertained by Major Macdonald. Angles were also taken from time to time in the canoe. Distances on land were obtained from a pedometer, the time of the caravan being taken as a check. Distances on the lake were obtained from the time of the canoe, the rate of the canoe being got by timing it along the shore and then pacing the distance. A check was obtained from a rock fixed by angles from Bale, on the Kampala-Kakunguru's road, and Pegi hill. This rock is about 5 miles west of Ngo, and was also fixed by angles from Ngo and the hill west of Naiko hill. The latter position was half a mile west of the former. I did not correct for this. I took the map to all the places from which angles were taken except Pegi

hill, and sketched in the details whilst actually looking at them. With regard to the names, I obtained them from the Wakedi through Kakunguru, who himself wrote them all down. I then made the Wakedi repeat them two or three times.

The name of the lake should be Choga, not Kioga; the Wakedi, Waganda, and Wasoga all call it Choga. The names in Usoga I obtained through a servant of mine, who came from that country. As to the parts shown in dotted lines, Kakunguru, who is a very intelligent man, informed me that the Niriagite channel goes six hours north from the neighbourhood of Msara, and joins Lake Kwania; this information came from the Wakedi, who also said the Nirangite was marshy in parts. Lake Kwania Kakunguru had himself seen. He said it was four to six hours' march from the north of Lake Choga, about 2 miles wide, and joined the Nile near Mruli to the south of the Marusi or Mahorsi hills. He drew a sketch of it and Lake Choga on the ground. I may mention that, before seeing it, I put in Siria bay from his description within three-quarters of a mile of the position finally fixed. The Gogonis channel, Mpologoma, were put in from the description of the Wasoga at Ngo. They pointed out the direction and named the number of days' march; I do not regard this as so reliable as Kakunguru's information. The road through Usoga is very narrow and winding; six or eight compass bearings had to be taken to a mile. The work was done with a small pocket-compass, checked, whenever possible, by long bearings taken with the big compass. On reaching Lubwa's, the latitude was correct; in longitude I was 2 miles too far to the east. A correction of a mile was made in the distance between Kibure and Namlimoka island, which was, I think, somewhat great, and the remaining mile was corrected between Ngo and Lubwa's. As the position of Lubwa's with reference to Kampala has not been absolutely fixed, it is doubtful whether these corrections should have been made. No astronomical instruments were available for my use, and I was unable to take observations.

SOME NEW BOOKS ON AFRICA.

By EDWARD HEAWOOD, M.A.

It is impossible even briefly to notice all of the many books on Africa called forth by the growing interest in that continent, and a selection must therefore be made of those most likely to possess permanent value as additions to our geographical knowledge.

First in point of date since the last batch of African books was noticed in our pages, comes Dr. Freeman's work * on the countries lying

* 'Travels and Life in Ashanti and Jaman.' By R. Austin Freeman. London: Constable. 1898.

behind the Gold Coast, in which the author describes a journey to Bontuku made so far back as 1888, and the subject of a paper in our 'Supplementary Papers' (vol. iv.). But while, of course, presenting few novelties from the point of view of mere topography, it gives an unusually complete picture of the wider relations of the country and its inhabitants, all the more valuable by reason of the extreme scantiness of the literature of the Gold Coast back countries, and as supplying a record of the natives when little touched by outside influence. The author's lengthened residence in the colony enables him to speak with full knowledge, and he has made good use of his opportunities of observation.

In his account of his journey, Dr. Freeman carefully notes the various types of country passed through, and in his map distinguishes the areas occupied by each, defining, in addition to the main gradations from dense forest through orchard-like country (such is his term for the landscape often described as park-like) to treeless steppe, various special forms along the coast-strip west of the Volta. His remarks on the dense forest are interesting if somewhat speculative, and if accepted would tend to modify our ideas on the subject. Especially characteristic of these forests are the silk-cotton trees (*Bombaces*), which, unlike our deeply rooted oaks, etc., appear to stand on a wide-spreading, shallow base. After suggesting as a possible reason the scarcity of earthworms, which, if present, would help to bury the roots by their castings, he goes back for the primary cause to the characters of soil and climate observable in the forest. It is somewhat surprising to learn that this is marked, in contrast to the more open country, by an absence of surface soil, which Dr. Freeman supposes carried away by the excessive rainfall. This can hardly apply to tropical forests generally, from which the Ashanti forest also seems to differ by the thorny nature of the undergrowth. Its area appears coextensive with that of a red ferruginous sandstone formation. In the concluding chapters, the author treats of the dress and ornaments of the natives, the history of Ashanti and its relations to Great Britain, malaria, and commerce. He deplores the attempt to make the natives adopt European dress, which converts them from Africans to "niggers." He considers that the breaking up of the Ashanti power has had a bad effect on commerce by stopping the native caravan traffic with the far east and north, which alone could create a demand for European products. A great desideratum is the improvement of water-communications, especially on the Volta. With regard to malaria, he looks forward to beneficial results from the modern study of its nature and causes, but considers that at present the disease is increasing both in prevalence and malignity.

As dealing also with West Africa, Major Mockler-Ferryman's book *

* The Imperial Library: 'Imperial Africa.' By Major A. F. Mockler-Ferryman. Vol. i., 'British West Africa.' London: The Imperial Press. 1898.

may be next referred to. It forms the first of a popular series, which should prove useful in bringing before the public the principal facts concerning the British empire abroad, and contains a mass of information brought together with much care on the history, peoples, etc., of the British West African possessions. The account of their exploration —so far, at least, as accomplished by British travellers—is very complete. A want of clearness is occasionally noticeable, which may give rise to misconception. Thus the Portuguese voyages on the West Coast are too closely connected with the search for Prester John's empire, while the murders of Dr. Vogel and his attendant Macguire are mentioned in connection with their journey to Yakoba, nothing being said of Vogel's subsequent visit to Wadai. The English word "guinea" is explained as derived from the Guinea coast, but nothing is said as to how the coast itself got its name. There is some confusion of ideas relating to the Berlin Conference of 1884–85, which is supposed to have made definite regulations regarding "spheres of influence," of which the idea even is only vaguely hinted at in the "General Act" of the conference. A confusion is shown between the decisions of this body and subsequent negotiations between individual powers, and it is even stated that "broad lines of demarcation were laid down, confining each European power to certain districts;" that "the coast possessions were apportioned a given amount of background, or, as it was termed, 'Hinterland,'" and so on. In the concluding chapter the author makes some judicious remarks on the problems of the future, of which he entertains sanguine views. The maps are not quite up to date, old plates having (as is too often the case in this country) been utilized.* Thus, for the Sierra Leone boundary, the results of the latest survey are not shown, and the source of the Niger is over half a degree out of its true position, while Abyssinia is still shown as an Italian protectorate.

Of the various works treating of Egypt and neighbouring territories, few can be expected to add much to our geographical knowledge. We can only speak of that of Mr. Silva White, whose plucky attempt to reach the forbidden oasis of Jarabub last summer is well known. Mr. White has written an attractive narrative of the journey,† enlivened by a good deal of quiet humour. Although he calls himself an amateur, in search rather of impressions than results, he tells enough to show that a fair share of the hardships of travel fell to his lot during the passage of the Libyan desert, with its long waterless stages, whitened with the bones of camels and exposed to the stifling *Khamsin* winds. His power of imagination enables him to give a vivid picture of the desert, the spell of which he has felt in its fulness. Although unsuccessful in his

* The rainfall map first appeared twenty years ago!

† 'From Sphinx to Oracle.' By Arthur Silva White. London: Hurst & Blackett. 1899

ambition to reach the stronghold of Senussiism, he was able to throw some light on its recent developments, and his summary of our knowledge of the subject will be of much use to inquirers. Apart from the fierce fanaticism of this the most powerful sect in Islam, perhaps the most noteworthy fact is the doctrine of emigration from infidel countries, which must have important results in attracting a population to the Sahara. New routes are being opened up, and oases created along these highways of commerce, and we are told that any Mussulman may travel without scrip or purse across the whole breadth of the Sahara from Wadai to Benghazi. The headquarters of the sect is now at Kufra, Jarabub serving merely as a sort of university for its adherents.

The unusually friendly relations which Mr. White was able to maintain with the people of Siwa gave him special facilities for observation, and his description of the place shows what a mine of interesting material awaits further research. The town is described as "one solid though friable rock, sculptured into dwellings, past and through which streets, lanes, rough causeways, flights of steps, tunnels, and galleries lead from point to point, laterally, vertically, spirally." Although Egyptian territory—the reputed frontier lies half a day's march to the west—Siwa is as much out of the world as the most remote districts of Central Africa, and the few Egyptian officials are exiles in effect if not in fact. Mr. White's photographs give an excellent idea of the outward appearance of the place.

As dealing with a somewhat kindred subject, the English translation of Captain Bruun's work,* originally published four years ago, may here be mentioned. It gives the account of a journey made among the Berber tribes of the Matmata mountains and neighbouring regions of Southern Tunisia, respecting whom any addition to our knowledge is welcome. Unlike the Senussi sect, these Berbers are the least fanatical of Moslems, and Captain Bruun met with a cordial reception among them. He gives a useful chapter describing the various tribes of Tunisia.

The volume† in which Lieut. Werther publishes the results of the Irangi expedition of 1896–97, is one of those records of solid scientific work which so often appear in Germany. The actual description of the journey is wisely kept within very moderate limits, and the bulk of the volume is taken up with memoirs by experts on the scientific observations and collections made by the leader and his companion. Thanks to the liberal way in which the expedition was equipped, these are unusually valuable. Lieut. Werther's clear sketch of the physical geography of the countries visited had previously appeared

* 'The Cave-dwellers of Southern Tunisia.' London & Calcutta: Thacker. 1898.

† 'Die mittleren Hochländer des nördlichen Deutsch-Ost-Afrika.' Von C. Waldemar Werther. Berlin: Paetel. 1898.

in substance in *Petermanns Mitteilungen*, together with the map, and has already been noticed in the *Journal* (vol. xii. p. 189). Full details are given as to the methods employed for the astronomical, barometrical, and other observations, and the degree of confidence to be placed on the results. Lieut. Werther kept throughout a meteorological journal, which gives both barometrical and temperature readings with great regularity, and occasionally the vapour pressure and relative humidity. Unusually high maxima of temperature have been omitted as possibly due to effects of radiation. The relative humidity (in the rainy season) is never recorded as below 86 per cent. The geological observations—the work of Herr von Tippelskirch—are of special value. Some hundreds of specimens were brought back, consisting mainly of archæan schists and granites, sedimentary and eruptive rocks being proportionately scarce. Herr von Tippelskirch thinks, however, that the outbursts of Mount Gurue must have been very considerable and of no very remote date. The zoological collections are also reported on, and Prof. Luschan gives a useful *résumé* of our knowledge of the native tribes.

Another German work lately received is Dr. C. Keller's account of the East African Islands,* forming the second volume of the 'Bibliothek der Länderkunde.' It deals with Madagascar and the groups in the Southern Indian ocean, including even Kerguelen's Land, the Crozets, etc., but not Zanzibar or other islands near the coast. It is not solely a compilation, although all the best authors have been consulted, for the author has visited most of the islands, and thus writes from personal knowledge. Madagascar, of course, occupies the largest space, a clear description being given of its natural features under various aspects, as well as of the history of exploration and attempts at colonization. Dr. Keller lays stress on the long isolation which has resulted in the present peculiar forms of life, holding, unlike Keane, that the ancient Indo-African continent dates back entirely to pre-Tertiary times. With regard to the inhabitants, too much stress must not be laid on linguistic facts, for only the Hovas are really of Malay affinities. The book is well illustrated and provided with maps, and forms a useful summary of our knowledge respecting the East African Islands.

The publication of a life of Emin Pasha,† after the voluminous literature which appeared in connection with the Relief Expedition, may appear to some uncalled for; but it must be remembered that the events which came before the public at that time formed a very small part of the whole life and work of the Pasha in Africa, and that no just verdict on his achievements could be given from the fragmentary

* 'Die Ostafrikanischen Inseln.' Von Prof. Dr. C. Keller. Berlin: Schall & Grund. 1898.

† 'Emin Pasha: his Life and Work.' By Georg Schweitzer, with Introduction by R. W. Felkin. London: Constable. 1898.

accounts previously published. Whatever opinion may be held of Emin's powers of administration, there can be no doubt that on the field of scientific work he stands in the very first rank of African explorers. With the exception of the volume published in 1888, no systematic record existed of the years of labour devoted to the task he had made his own, so that an impartial and authoritative history of his life, such as Herr Schweitzer has written, was distinctly needed. On many points it sheds new light, for the author has had access to the whole of Emin's diaries, and to correspondence not hitherto made public. Although by no means blind to Emin's faults, Herr Schweitzer occasionally shows a national bias, which arises in great part from misconception. Dr. Felkin's introduction to the English edition, and the letters of Emin there printed, fully exonerate his sympathizers in this country from the imputation of interested motives, and show how completely at one time Emin looked to Great Britain for support, even by political action. The closing acts of his life can only be explained, Dr. Felkin thinks, by the extraordinary and unexpected influence sometimes exercised by nationality.

The latest contribution* to our knowledge of the countries bordering on Emin's old province to the west is supplied by Captain Guy Burrows, an English officer in the service of the Congo State, who played an important part in the pacification of the Upper Welle region in 1894–97, and has since been promoted to the post of commissioner of the Aruwimi districts. Very little has hitherto been published with regard to the many Belgian expeditions into remote corners of the State, so that any new information is to be welcomed. With Captain Burrows's narrative are interspersed voluminous notes on the natives of the Upper Welle, of whom he seems to have made a special study. The title of the book is somewhat of a misnomer, as the author touched only the northern fringe of the pygmy habitat, and his chief dealings were with the Azande tribes, with whom the State was then at war. His notes on these are perhaps the most valuable part of the book, considering the importance which has been attached to them as helpers in the regeneration of this and adjoining parts of Africa. He was struck by their total difference from the Negroes, and says that but for their colour many of them might be taken for European Jews. It is perhaps to be regretted that collision with the white man has prevented the formation of a powerful Azande empire, which their previous victorious advance seemed to render possible. A chapter is devoted to the subject of cannibalism, which the author says is certainly not due now to the pressure of hunger, nor to the idea that courage may be acquired by the practice. The book suffers from the want of a map and index, the spelling of names is far from systematic, and the illustrations have often

* 'The Land of the Pigmies.' London: C. A. Pearson. 1898.

no immediate reference to the text. Though sometimes very indistinct, they have at least the advantage of being trustworthy. Mr. Stanley's introduction is largely a defence of Belgian policy on the Congo.

The doings of the French to the north of the Congo State have likewise been the subject of few publications, so that M. Castellani's book,* describing the early stages of the Marchand Mission, to which he was attached, may be of some service at the present time, though written in a popular style and laying no claim to scientific value. Another recent publication with an indirect bearing on French colonial undertakings is M. Schirmer's translation of Von Bary's journal,† kept during his journey to Air in 1876–77, since which no European has visited that country. As the journal had already been published in German, the value of the new edition lies principally—apart from the attention called by it to a traveller whose work is not widely known—in the translator's notes and geographical index, and the appendix, in which he has brought together the meteorological data scattered throughout the journal.

A useful collection of documents relating to the partition of Africa, compiled by Captain Van Orthoy, has been lately issued in Brussels.‡ Its plan coincides in the main with that of Hertslet's 'Map of Africa by Treaty,' but its bulk has been lessened by the omission of all agreements regarding cessions of territory in the past which have fully taken effect. All documents, however, are included which are still in force as fixing international boundaries. The arrangement is chronological, but a classified table gives the reference to the documents under the head of the powers interested. A useful feature is the retention of the original language or languages of all the documents, while the collection includes some important treaties signed since the publication of Hertslet's work, such as the latest with Abyssinia. Other important documents not given in the latter are the Sultan's firmans of 1841 and 1865 relative to the Eastern Sudan, and the declaration of neutrality of the Congo State signed at Brussels in 1894, which contains a full statement of the then-existing boundaries. No information is given respecting the limits as laid down in 1885, which may still be of importance as regards the frontier north of Tanganyika. The map has been carefully compiled, and contains no error of importance.§

* 'Vers le Nil Français.' Paris: Flammarion. [1898.]

† 'Le Dernier Rapport d'un European sur Ghat et Les Touareg de l'Air.' Paris: Fischbacher. 1898.

‡ 'Conventions Internationales définissant les Limites Actuelles des Possessions, etc., in Afrique.' Brussels: Soc. Belge de Librairie. 1898.

§ The following minor inaccuracies occur: The whole western shore of Lake Albert is coloured as if leased to the Congo State, whereas the leased portion ends immediately south of Mahagi. The territory actually dominated by Abyssinia is not shown as extending far enough to the south-east, and there is no indication that the territory west of the upper Zambezi is still unapportioned between Portugal and Great Britain. The British Central Africa Protectorate is also wrongly shown as extending west to Lakes Mweru and Bangweolo.

One or two quite recent works must be added to our list. The first of these is Sir Harry Johnston's manual on the colonization of Africa.* The title hardly perhaps explains the true scope of the volume, which is not confined to colonization in the strict sense of the word, but really embraces the whole history of intercourse of foreign nations with Africa from the earliest historical periods, while the question of the possibility of European colonization in that continent is very briefly touched upon, as is but proper considering the historical standpoint adopted. Sir Harry Johnston's writings are always original and suggestive, and he has succeeded in making the present work much more than a dry record of facts. After an opening chapter on the early history of Africa down to the close of the Mohammedan invasion, he takes up separately the history of the various European nations in Africa, with chapters on the slave-trade, missions, and exploration. This method of treatment involves a certain lack of historic continuity, by which the wider aspects of the subject are somewhat obscured, but this was perhaps unavoidable. The remarks in the opening chapter on the racial history of Africa are interesting, though decidedly speculative. The author considers the Negroes, Hamites, and Semites as offshoots from one stock, the divergence probably taking place in Arabia. He endeavours to sketch the distribution of races about 3000 years ago, at which comparatively recent date he thinks the Negroes had not pushed far beyond the Equator, the Bantu dispersion from a home on the Nile-Congo watershed being held to be more recent. In telling the story of European enterprise, he shows a wide knowledge of the facts, and gives much interesting information not generally accessible, especially with regard to the earlier periods. The chapter on exploration is perhaps the best account for its length which has appeared, though containing one or two slips.† The concluding remarks on the probable future of the continent are deserving of attention. The author considers the parts suitable for colonization by Europeans to be practically limited to extra-tropical Africa, which, however, offers room for a great influx of population. He looks forward to a large overflow from India into the more sparsely peopled tracts of East Africa; to a less rigorous observance of Mohammedanism on the part of its adherents; and to a gradual identification of the Negroes with their respective European rulers.

Readers of Miss Kingsley's former volume on West Africa will have learnt to expect from her pen nothing of the commonplace, and her

* Cambridge Historical Series: 'The Colonization of Africa.' By Sir Harry H. Johnston, K.C.B. Cambridge University Press. 1899.

† We are told, *e.g.*, that Matteucci and Massari were the first to cross Africa from east to west; also that Révoil followed the brothers James in the exploration of Somaliland, and that Uechtritz and Passarge were explorers of the region between the Cameroons and the Benue watershed.

new work * on the same subject fully sustains the reputation of its predecessor in this respect. Freshness, force, and originality are its undoubted characteristics, and whatever may be the verdict respecting the views put forward, it is bound to rivet the attention of the reader from beginning to end, and provide both entertainment and instruction. The authoress has put down her ideas in the language that came first to hand, and for this very reason succeeds in driving home her points in a way that no nice choice of expression could effect. Needless to say, she has very decided opinions of her own, but they are often too much the result of personal bias and disinclination to see things in a commonplace light to be entirely convincing. Her predilections for the West African traders (with whom she is proud to identify herself), for the Negroes in their unsophisticated state, for the country itself, and in a lesser degree for French colonial methods,† make her, in particular, somewhat blind to the less favourable side of the picture. The book deals with a variety of topics, from the animal pests which everywhere make their presence felt, to the native laws of property and religious systems, and brings home to the reader in a forcible way the characteristics of the West African coast, not, however, untinged with a certain romantic halo. The subject most fully treated is the fetish question, which received less attention than it deserved in the former work, and on which new light may be thrown, Miss Kingsley thinks, by the recognition of at least four distinct forms or "schools" of fetish. In an interesting chapter devoted to early trade, the "silent trade" mentioned by the old writers is discussed, and accounted for—in West Africa—by the influence of fetish.‡

The section of the book with the most practical bearing at the present time is that which deals with the trade and government of British West Africa. Miss Kingsley speaks in the highest terms of the value of West African trade to the British Empire, holding that such tropical countries stand in the front rank (before India and China even) among future markets for manufactured goods. She is an uncompromising opponent of the Crown Colony system, on which she lays all the blame for the little progress yet made in the development of West Africa. She puts forward a detailed scheme for the replace-

* 'West African Studies.' By Mary H. Kingsley. London: Macmillan. 1899.

† It is curious to notice that where Miss Kingsley saw so much to excite her admiration, a French traveller, M. Foa, found cause for regret in the state of stagnation observed.

‡ Many other accounts of dumb trading might have been added to Miss Kingsley's list, *e.g.* of the older writers, those of Pliny, Cosmas Indicopleustes, the Periplus of the Erythræan sea, Ibn Batuta, and John de Marignolli. The earliest intercourse of the Russians with the Chukches is said to have been carried on in this fashion, while in modern times the Poliars of the Pulney hills are said to adopt the practice. The modern form seen by Miss Kingsley in West Africa is also mentioned by Mr. Millson (*Proc. R.G.S.*, n.s. xiii. 582).

ment of the present system, which certainly merits careful attention, although no doubt open to certain objections. A valuable addition to the book is formed by two appendices by traders long resident in West Africa, who have been prevailed upon to impart to the world some of the stores of information so rarely made available in such cases.

Mr. Bindloss's recent account of the Niger delta * will be read with much interest in connection with the work last spoken of, and is particularly useful as placing before the public many of the same facts in a somewhat different light. The author was attracted to West Africa by the desire to gain for himself some accurate knowledge of that region, the truth respecting which is so difficult to arrive at. The date of the journey is not mentioned, but internal evidence shows that it was anterior to the Benin massacre. Mr. Bindloss possesses considerable descriptive powers, and presents a series of unusually vivid pictures of nature in the Niger swamps, and particularly of the life of European traders, officials, and missionaries in that fever-stricken region; supplementing his own observations by many anecdotes and narratives connected with its history. His descriptions of the calm but strong flow of the delta streams, of the rapid obliteration of man's work by the vigorous force of nature, and of the toilsome building up of solid ground as the foundation for new stations, deserve special mention. Amid many harrowing stories of disease and death, as well as of human cruelty and superstition, there are also brighter pictures of heroic fortitude and devotion to duty. To the question, "Is it all worth while?" the author gives an unhesitating "Yes," laying stress on the advantages accruing to the home population from the trade of the region, while not the least gain is the drastic training which alone can maintain the vigour of a nation.

A very brief notice must suffice for the remaining books on our list. Mr. H. C. Thomson gives † a thoughtful discussion of the South African problem, as regards the new territories of Rhodesia, from the standpoint of a champion of the native races and an enemy of monopoly and speculation. He has many severe things to say of Mr. Rhodes, but, though a vigorous critic of our policy towards the Transvaal, he allows that the abuses in its government have much to answer for. The irrigation question in German South-West Africa is very thoroughly dealt with in a work by Herr Rehbock,‡ an engineer who visited the country on behalf of a syndicate, and who also sketches briefly the physical geography of the territory, and discusses its agricultural capabilities and possibilities of development. He advises—besides such steps as the improvement of means of communication—the

* 'In the Niger country.' By Harold Bindloss. Edinburgh and London: Blackwood. 1898.

† 'Rhodesia and its Government.' London: Smith & Elder. 1898.

‡ 'Deutsch-Südwest-Afrika.' Berlin: Dietrich Reimer. 1898.

establishment of agricultural colonies, and selects as the most suitable spot for a first experiment the neighbourhood of Hatsamas, south-east of Windhoek. The book is well provided with maps and diagrams, as well as with excellent photographic illustrations, and is a valuable addition to our knowledge of the country. German East Africa, again, is the subject of a work by Dr. F. Wohltmann,* who gives the results of his examination, as an expert, of the agricultural resources of that territory. His account is decidedly encouraging, and, with the illustrations which accompany it, gives an impression of progress and order which speaks highly for the persevering labours of German pioneers in that field. In spite of the large outlay which has been necessary to secure these results, the author considers that the benefits to the nation are such as fully to repay it. The work should be useful as a guide to those interested in similar undertakings in other parts of tropical Africa. Lastly, M. Wauters, than whom no one could have been better qualified for the task, gives a succinct account† of the Congo Free State, detailing the history of its foundation and development, and sketching the outlines of its geography, ethnology, and economic resources. The book will be of much value for purposes of reference, as it brings into convenient compass a mass of information elsewhere widely scattered.

WADDELL'S 'AMONG THE HIMALAYAS'—REVIEW.

By Colonel Sir T. H. Holdich, K.C.I.E., C.B., R.E.

Amongst the native states of the Himalaya, the little state of Sikhim is unrivalled for the magnificence of its scenery; and it possesses, besides, considerable political interest. Major Waddell's book gives a clear and very readable account of this part of the great Himalayan system, and if he has struck out no new or very original line of his own, he has at least made a pleasant study of a subject which can never lack interest so long as the love of mountaineering is inherent in Englishmen. Sikhim comprises the upper basin of the Teesta river, the headwaters of which rise near the northern passes to Tibet and Lhasa, which latter place is much more readily accessible from Sikhim than from any other part of our frontier. It is this which gives Sikhim a certain political, if not strategical, value. On its west is the gigantic chain of mountains culminating in Kanchenjunga, a spur from the main Himalayan axis, which separates Sikhim from Nepal. On the east another long southern extension from the Central Tibetan plateau shuts off Bhotan; but dovetailed in between Bhotan and Sikhim is a triangular wedge of Tibetan

* 'Deutsch-Ost-Afrika.' Schöneberg-Berlin: Telge. 1899.
† 'L'État Independant du Congo.' Brussels: Falk. 1899.

territory called Chumbi, which lies south of the Indo-Tibetan watershed, and which, until the end of last century, actually belonged to Sikhim. Through this extension flows the Mo river and its tributaries to the plains of India, and the route afforded by this river (which lies partly in Tibet territory and partly in Bhotan) is the only route which, according to Major Waddell, would open up direct communication between Tibet and the plains of India without encountering any formidable passes whatever. But there appears to be something wanting in Major Waddell's information as to the nature of the Mo route south of Rinchingong. The river is known to flow through an impracticable gorge where it washes the foot of Gipmochi, and this would certainly offer a considerable obstacle to any road project, to say nothing of a railway. Accurate surveys of Western Bhotan do not at present exist, although much valuable reconnaissance was completed by Godwin Austen during the Bhotan campaign of 1865-66.

Major Waddell's first excursion was from Darjiling by the Tibetan trade route to Gantok, and thence to the quaint native capital of Sikhim (the residence of the "king") Tumlong. This excursion took place about ten years ago. Meanwhile this route has developed rapidly under the able management of the local political officials. It will not be long before a cart road is open from Silligori (the terminus of the Northern Bengal railway) to Gantok, and with the increased facilities for communication thus afforded, a great impetus should be given to Tibetan trade. With this road in existence, the advantage of opening up any route which lies outside Sikhim territory becomes more than doubtful.

From Tumlong (of which mountain capital Major Waddall gives a most interesting account) his route lay northward by the Lachun valley to the glacial region which encloses the Donkia pass. He had a look at one or two little-known passes south of the Donkia, leading into the Chumbi basin, and then returned southward to follow the line taken by our troops under General Graham, when they turned the Tibetans out of Sikhim into Chumbi, over the Jelep pass, in 1887. It should be noted that the best-known and most frequented routes to Lhasa appear to be concentrated on the passes at the head of the Chumbi, or Mochu, valley, after passing from the Teesta basin by the Jelep (14,380 feet). This pass thus becomes an important point on the line of frontier communications. This route from Phari onwards was followed by Turner in 1783, and is obviously a route which is open to the passage of considerable bodies of men, or the Tibetans could hardly have used it. It avoids the gorge of the Mo river below Chumbi.

Interesting as Major Waddell's record of this north-eastern exploration may be, it is amongst the glaciers and snows of the north-west, lying under the cold shadow of Kanchenjunga and its kindred peaks, that the attraction of his story chiefly lies. Kanchenjunga, although not even the second highest peak of the Himalayan system, is not 1000

feet lower than Everest; and its dominant position, facing the forest-clad slopes of the outer ranges at Darjiling, invests it with a picturesque grandeur that is probably unequalled by any other mountain in the world. Everest (29,000 feet) is higher; but it unfortunately lies on the border between Nepal and Tibet, in a position so remote and inaccessible as to be beyond the reach of European exploration, and it is only doubtfully visible from the neighbourhood of Darjiling. Another gigantic peak, called Khambalung (which figures as Peak xiii. in survey records), lies in such close proximity as to interfere with any comprehensive view of the actual slopes of Everest from the south-east. It is only on the great western watershed of Sikhim dividing the Teesta affluents from those of the Tambar, in Nepal, that a really clear view of Everest over-topping the shoulder of Peak xiii. may be obtained.

Is there any peak higher than Everest lying beyond it to the north or north-west on the borders of Tibet? This is a question which Major Waddell is unable to answer positively, but the general testimony of such explorers as have sighted Everest from the Tibetan side, coincides with that of the surveyors who have fixed the position of the great peaks of the Himalaya from the Indian frontier—that there is not. The Tibetan name for the Everest group appears to be Lap-chi-kang, or "the outer glacier pass," and that of the actual peak, Jomo-kang-kar, or "the Lady White glacier;" and these Tibetan people, who "inhabit the surrounding country, and ascend the sacred mountain for purposes of worship, as far as they dare," speak of another Lap-chi-kang beyond it to the north, which they believe to be higher. The only European authority for a higher altitude than Everest is Mr. Graham, who claimed to have ascended Kabru (24,000 feet), a peak to the south of Kanchenjunga, and on the same great spur of the central Himalayan axis. But Mr. Graham was almost certainly mistaken in the peak which he ascended (Major Waddell investigates this question at some length), and his observations are hardly trustworthy; whilst it is obviously impossible that Tibetans living at the foot of these mountains can have the means of discriminating between comparatively small differences of height amongst such vast altitudes. Until triangulation can be so far extended as to cover all the high altitudes bordering Nepal on the north, the doubt must remain unsolved; but it is extremely unlikely that any higher peak could have remained undetected, even with such observations as we at present possess.

It is hardly surprising that Major Waddell should have found much difficulty in determining his absolute elevation by means of aneroids or hypsometers. The former are proverbially uncertain, and the latter require much more skill to manipulate than is usually supposed. The chief difficulty, no doubt, is to get the water to boil properly; and the native explorers of the Indian survey are by no means always successful in overcoming this difficulty. At the same time, it is a matter of

common experience that natives are adepts at the art of coaxing water to the boiling-point under circumstances that would utterly baffle any European operator. On the whole, they succeed fairly well. This is, at any rate, the method which is usually adopted for determining the heights of passes and points on the elevated plateau lands to the north of India by Indian surveyors.

Major Waddell has written a story which is not only interesting, but instructive. He is a geologist and a botanist, as well as a keen observer with artistic perceptions. The result is a book which adds, in a pleasant fashion, a great deal to our general store of knowledge about one of the most interesting "playgrounds" of the Himalayas.

THE BRITISH NATIONAL ANTARCTIC EXPEDITION.

At the meeting of the Royal Geographical Society on March 27, the President, Sir Clements Markham, made the following very satisfactory statement with reference to the progress of the subscriptions towards the equipment of a National Antarctic Expedition:—

"In my opening address this Session, in referring to the urgency of obtaining funds for an Antarctic Expedition, I expressed my conviction that the spirit which influenced the patriotic adventurers of the Elizabethan age was still alive among us. Many good men and true have answered to my appeal. But I now have the pleasure of announcing to you an act of unselfish liberality which does indeed remind us of the merchant princes of the days of old. Our associate, Mr. L. W. Longstaff, a Fellow of this Society of many years' standing, has subscribed a sum which virtually puts an end to our chief difficulty. We shall be enabled, at least, to equip an efficient expedition consisting of one vessel, and to co-operate with the Germans in the scientific exploration of the Antarctic Regions. You will like me to read to you the letter I have received from Mr. Longstaff, from which you will learn the noble motives that have actuated him, and the munificence of his contribution.

"'*To the* President of the Royal Geographical Society.

"'Dear Sir Clements Markham,

"'Being convinced of the imperative need of the immediate preparation of a British expedition, I have the pleasure to inform you that I have this day paid to the credit of the National Antarctic Expedition with Messrs. Cocks, Biddulph & Co. the sum of £25,000, which I trust will meet the exigency of the case.

"'Though my attainments are but slight, I have all my life been much interested in scientific matters, and as a Fellow of our Society for nearly thirty years, it gives me peculiar pleasure to be able thus to contribute

towards the advancement of our knowledge of the planet on which we live.

"'I am, dear Sir Clements,

"'Yours faithfully,

"'LLEWELLYN W. LONGSTAFF.'

"'Ridgelands, Wimbledon, March 22, 1899.'

"I will now ask the meeting to pass a cordial vote of thanks to Mr. L. W. Longstaff, which I shall have great pleasure in conveying to him."

In connection with the above, it may be of interest to state that Mr. Longstaff's father, Dr. George Dixon Longstaff, was one of the Founders and a Vice-President of the Chemical Society. He himself was born in 1841, and was educated at the Wandsworth Proprietary School, under the late Bishop Staley, and studied chemistry at Frankfort-on-the-Main, and under the late Prof. A. W. von Hofmann at the Royal College of Chemistry. He was the first vice-chairman, and is still a director of Blundell, Spence, and Company, Limited, manufacturers and merchants. He has done much to improve the relations between employers and employed, and has established a pension fund for the employees of his firm. In 1880 he retired from the 1st East Riding of Yorkshire Rifle Volunteer Corps, with the rank of Lieut.-Colonel. Mr. Longstaff's well-timed liberality has made it possible to return a favourable reply to the inquiry in Baron von Richthofen's letter, which is given on a previous page. With the subscriptions received or promised from various quarters, the funds at the disposal of the joint Antarctic Committee now amount to £40,000. It is hoped and believed that Mr. Longstaff's generous example will be followed to a greater or less extent by others, and that in the end a sufficient sum may be obtained to equip a National Expedition worthy of the country.

THE MONTHLY RECORD.

EUROPE.

Rainfall in the Lake District.—Amongst the short papers prefixed to Symons' volume of 'Rainfall Tables for 1897,' is one on the mean annual rainfall of the English Lake District, which forms an almost perfect miniature specimen of skilful discussion of rainfall statistics, particularly in the way of showing how close approximations to true long-period means may be obtained from short or irregular records. The orographical map from Dr. Mill's paper on the Lake District is reproduced, and facing it is a map showing the mean annual rainfall, the isohyetals being drawn in thicker lines the greater the rainfall they represent—a distinct addition to graphic methods for this class of work. One of the most interesting points brought out by the discussion is the fact that the line of 100 inches encloses an area of not less than 70 square miles; and it is supposed that the 100-inch area may extend even further eastward than is shown—probably as far as Kentmere reservoir and Kidsty Pike. In both Langdale and Borrowdale the annual rainfall is shown to be nearly 130 inches. The rapid changes of rainfall within short distances are very remarkable; between Great Gable and the Stye, 1½ mile apart, the average difference is 71 inches, equal to 0·04 inch per yard. The paper is one of great importance in affording almost the first opportunity of investigating adequately the curious anomalies known to exist with regard to the distribution of the rainfall and the prevailing rain-bearing winds.

Loch Coruisk and the Coolin Hills.—In the summer of 1897, a party of members of the Scottish Mountaineering Club, under the guidance of Mr. W. Douglas, of Edinburgh, camped for some time at the head of Loch Coruisk, in Skye, and occupied their time in fixing altitudes and filling in the detailed work on the 6-inch Ordnance Survey map, as well as in feats of rock-climbing. Mr. Douglas published during last year, in the Scottish Mountaineering Club's *Journal* (vol. v. p. 1), a full account with illustrations of the life in this camp, and also the Ordnance Survey map of the Coolins, bearing in a special character the names and heights added by the mountaineers. Occasion was taken to make some soundings in Loch Coruisk, a small lake little over a mile in length, and surrounded by picturesque cliffs; the surface stands about 26 feet above sea-level. Five soundings were made in the upper part of the loch above a group of small islands, which may possibly mark a division into two basins, and the greatest depth observed was 96 feet, near the steepest part of the shore. In the centre two soundings, some distance apart, both showed 64 feet. A note by Mr. J. Rennie, on the magnetic properties of the rocks near Loch Coruisk, is given in an appendix. At one place, the bearings of a distant object, taken from two points not ten paces apart, but on different sides of a spur of rock, showed a difference of 57°, and in another place a difference of 6½° was observed.

The Influence of Lake Balaton on the Climate of the Surrounding Region.—In the fourth part of vol. i. of the *Resultate der wissenschaftlichen Erforschung des Plattensees*, the investigations into the climatic conditions, and especially the rainfall, of the district around Lake Balaton are described by Dr. Saringer and Herr Odon von Bogdanfy. The results of twenty years' observations of atmospheric pressure and temperature, wind, humidity, and rainfall at fourteen stations on the margin of the lake and in the neighbourhood are discussed, and besides other illustrations there are twenty-four rainfall maps for the whole of Hungary, specially prepared by the *Reichsamt für Wasserbau und Bodenverbesserung*. Notwithstanding the comparatively small size of the lake (less than one-ninetieth the area of Lake Michigan), the effect of its presence on the temperature of the surrounding region is very distinctly marked: the daily maximum is lowered by about 1° Fahr. on the mean of the year, while the daily minimum is raised by 1°·5 Fahr. on the same period, and more than 2° Fahr. during the summer months. Both the diurnal and annual range of temperature is less than in the rest of Hungary, and the raising of the minima being greater than the lowering of the maxima, the mean temperature is on the whole above the normal. The rainfall decreases somewhat from south-west towards north-east, the lake lying in the transition area between the humid districts to south-west and west, and the regions of small rainfall to the eastward. The amount of sunshine is relatively high, "rainy" days number only one in four or five.

Glaciation in the Rila Mountains, Bulgaria.—A valuable paper on the Rila mountains, with a special view to the traces still existing of a former glaciation of the range, is contributed by Dr. Cvijic to the *Zeitschrift* of the Berlin Geographical Society (1898, No. 4). The author, who is well known for his useful monograph on the phenomena of the "Karst," carried out, in company with three Bulgarian savants, a careful exploration of the range in the summer of 1896, starting from Samokov, on the north side of the mountains, and making a series of excursions through the upper valleys of the Iskar, Reka, and other streams, and across the intervening ridges, with the ascent of Mount Mussala, the highest summit of the Rila. Traces of glacial action were soon met with, and this subject fixed the attention of Dr. Cvijic throughout the whole trip, by reason of the

interest attaching to it from the fact that the phenomenon has been denied to exist in the Balkan peninsula. He also studied the general orographic structure and hydrography of the range, and the first section of his paper gives a clear account of it from these points of view. The second discusses in detail the traces of former glaciers discovered and their relation with the present extent of névé in the range. The Rila possesses no continuous covering of snow, as its highest peaks do not reach above the climatic snow-line. The abundance of snow which has struck most travellers is due to the perennial patches of névé, found chiefly in the *Kare*, a feature characteristic of the range, to which Dr. Cvijic devotes special attention. They are described as broad semicircular niches, occurring at the head of the valleys, with a steep wall above, but open in the opposite direction. Their floors are generally flat, often containing pools of water held in by ridges of rock or by moraines. The valleys generally fall in a series of steps, of which the *Kare* form the highest member. They are generally found in association, and are in that case separated by sharp ridges of rock. Of a total of about thirty-two in the range, twenty-five face the north and seven the east, so that they are restricted to these sides of the ridges. All occur above the limit of trees. It is in the *Kare* that the chief traces of glaciation are found, and these are specially abundant in the *Kar* of Edi-jol (Seven lakes), of which (as of some others) an enlarged map is given with the paper. The general map, which is coloured according to contours, shows all the *Kare*, as well as the moraines, *roches moutonnées*, and other vestiges of glacial action. The Rila is the most southern point in Europe where traces of an ice-age have been found, and, as might be expected, such occur only in the upper region, the former snow-line being placed by Dr. Cvijic at about 7000 feet.

The Glaciers and Forests of the Western Caucasus.—The preliminary report on a journey in the North-Western Caucasus, made in 1896 under the auspices of the Russian Geographical Society, is given by N. A. Busch in the two last numbers of *Petermanns Mitteilungen* for 1898. The special object of the journey was the investigation of the glaciers and vegetation of the upper parts of the little visited valleys on the north side of the Western Caucasus west of the Klukhor pass, traversed by tributaries of the Kuban. They were reached by way of Batalpashinsk and the Aul Teberdy, where the preparations for the separate excursions were made. The first continuous forests in the Kuban valley were reached near the village of Khumara, where the hillsides are tree-clad. As has been found elsewhere on the western flanks of the Caucasus, a forest zone of deciduous trees of the ordinary European type is first found, and conifers first appear in any numbers higher up the valley. The first valley explored was that of the Great Selenchuk. Beech woods of the character of a primeval forest were here met with. The upper valley bears the name of Psysh, from the conical peak of that name, 3787 metres (12,261 feet), which closes it in. A glacier was discovered at the head of the valley, and two at the source of the Sofja, a tributary stream so named by the Abkhasians who formerly dwelt here. The principal glacier is said to have retreated of late years. The woods of these upper valleys consist either of pines or of firs and spruces, intermixed with deciduous trees and brushwood. At the source of the Psysh, a forest of firs has quite a primeval character, and the Aurochs is said to have formerly roamed there. It is at no great distance from the Sagdan valley, where they still exist. The next valley visited was that of the Axaut, previously undescribed, though an easy path up it was found. Pine forest, broken by small meadows, extends to its head, where there are two glaciers of the first class longer than that of Marukh (at least 3 miles according to Dinnik). That at the western source is said to have retreated 700 yards since about 1870. Other

glaciers were examined in the valleys of the Teberda and Marukh, some of which had been previously visited. One at the source of the Alibek, a tributary of the Teberda, was also almost equal to the Marukh glacier. Herr Busch crossed the Marukh pass and examined the great Shkaltre glacier, afterwards making his way to Sukhum Kale by the route followed by General Babich's army in 1878. In all thirty glaciers were visited, while a large botanical collection was made, as well as a botanical map of the Kuban region. The latter shows the wide distribution of pine and birch woods, which seems to coincide with the region of dark brown quartz-conglomerates, while the eruptive formations are clothed with firs. The aspect of the slopes does not appear to affect the forest distribution. On the west flanks of the Central Caucasus the deciduous forests clothe the Jurassic belt; the crystalline schists are bare, while the coniferous woods are found in the granitic glens near the glaciers. The old Russian 5-verst map was found very inaccurate in some places, especially in the region of the upper Axaut and great Selenchuk. The new 1-verst survey is not yet, we believe, complete for the Western Caucasus, although extracts from it, showing in detail the glacier sources of the Teberda, were, by permission of the staff, published by Mr. Douglas Freshfield in 1896. Herr Busch, strangely enough, makes no reference to its existence, although several of the glaciers he describes (Dombai Ulgen, Ptuish, Amanauz) are shown in the portion published by Mr. Freshfield. Herr Busch was more of a horseman than a mountaineer, and more of a glacier student than a glacier explorer. His studies were, consequently, mainly confined to the lower extremities of the ice-streams. He gives few accounts or measurements either of the mountain crests or the upper *névés*. From his narrative it appears that the chief glaciers west of the Klukhor pass attain an average length of 5 versts (3½ miles). This is the length attributed by the new Russian map (1 verst to the inch) to the Amanauz glacier, which Herr Busch believes to be the largest in the district. It is to be hoped that some competent mountaineers may visit and give us a more comprehensive description of the scenery and summits of this interesting region, and of the high-lying glacier fields, resembling those of the Adamello, conspicuous from the Black sea in fine weather.

Was the Kalmuck Steppe formerly wooded?—In the eighth number of the current volume of *Globus*, Prof. Nehring, of Berlin, discusses the question of the former existence of woods on the present Kalmuck Steppe, near Astrakhan. Recent investigations have, he says, proved that woods once covered much larger areas in the steppes of South Russia than at present, and he is inclined to believe that the same was the case in the region of the lower Volga. He bases this opinion on the recent discovery near Luchka, on the right bank of the Volga, 25 miles below Sarepta, of fossil remains of various animals, which elsewhere show a decided preference for partially wooded districts. The formation in which they were found seems not fluviatile, but a sub-aërial deposit resembling loess, while the remains show no signs of transport by water, so that Prof. Nehring thinks it almost certain that the animals actually lived in the neighbourhood in which the bones were found. The best-preserved relic is the scull of a bison, more nearly allied to the *Bison Europæus* than to the *Bison Priscus* of the German *diluvium*, and apparently very like the bison of the Caucasus. The next specimen is the antler of a stag, which is interesting because no such animal has previously been known to exist in these parts north of the Kuma. Prof. Nehring is inclined to identify its owner with the maral of the Caucasus. Another antler belongs to a species of *Megaceros*, the genus to which the Irish elk belonged, while the last animal represented is the mammoth. From the presence of the two last, Prof. Nehring concludes that the former character of the district was that of a steppe alternating with patches of wood.

ASIA.

Dr. Futterer's Travels in Eastern Asia.—Writing from Hankau on January 26, Dr. Karl Futterer sends us the following summary of the last stage of his great journey across Asia, which supplements his letter from Liang-chou referred to in the *Journal* for November, 1898 (vol. xii. p. 520): "From Liang-chou, travelling with mules, we took the high-road to Sining-fu, and then continued our journey for some distance up the valley of the Sining-ho, where we completed the preparations of our journey into Tibet with yaks. We reached Koko-nor in August, and turned southwards from about the middle of the lake-shore across the South Koko-nor mountains to the Dabassu lake, and, turning eastward along the great range on the south of that lake, crossed the range and reached the Hwang-ho at the Djupar mountains. We followed the Djupar range to the south-east by the Baa river, and a series of hitherto unexplored rivers and mountain chains which run in a westerly direction to the Hwang-ho. We halted on one of the largest of these, the Shtsetse river, on August 15, and thence made an excursion southward as far as the Hwang-ho, which we reached, travelling with horses and very little baggage, in four days. At the point where we reached it, the great river flows from east-south-east to west-north-west through a broad valley with high terraced walls of alluvium on the left side. On the left side of the valley, a few kilometers distant, a very high snow-covered mountain range runs parallel to the river. Nothing was to be seen of the bend of the Hwang-ho valley from this point, and there was no way along the river nor any means, such as a ferry or bridge, for crossing the broad stream. We returned to the camp on the Shtsetse river, crossing on our way, on the right bank of the Hwang-ho, a mountain of Palæozoic coral limestone, and several chains of ancient sandstones and schists, all of which had a west-north-west strike. We then resumed our former direction of march to the south-east and east parallel to the Hwang-ho valley, but at some distance from it, traversing high mountainous country and crossing one pass of about 13,000 feet. We reached the valley of the upper Tao-ho on November 8, and two days more on horseback would have brought us to the Hwang-ho, which we should have met at a short distance from the road leading directly eastwards from the Hwang-ho to Sung-pan-ting. Our yak caravan could have reached Sung-pan-ting in twenty-five to thirty days, but on account of an attack by Tibetan bandits at the monastery of Shinse, on the upper Tao, that journey had to be abandoned. In the fight several Tibetans were wounded, but our yaks and horses were driven away; the goods and collections were fortunately saved. The expedition succeeded in descending the Tao valley with all the collections, and reached Tao-chau on November 21, whence the expedition started on its return through Western China to the coast. We travelled by Min-chou and Pingling-fu to Singan-fu, and thence over the Sing-ling mountains to the Tan river, which was reached on December 31. The valuable scientific collections were conveyed by mules to Lungkuchai, where they were shipped in two boats on the Tan river. The boat journey commenced on January 2, and on January 12, at Sahokeo, on the Han river, they were transhipped to a larger vessel, and all arrived at Hankau on the 24th. We are now on our way home by Shanghai and America. The whole of our routes in the hitherto unexplored portions of North-Eastern Tibet have been surveyed topographically and geologically; the meteorological observations will be kept up until we reach Shanghai, but the geological survey ceased at the commencement of the river journey. I hope to pass through London about the end of March, on my return to Germany."

Dr. Cholnoky's Physical-Geographical Researches in China.—The first number of *Petermanns Mitteilungen* for 1899 contains the preliminary report by

Dr. Cholnoky on the scientific results of his journey in China, an outline of which was given in the *Journal* in May last (vol. xi. p. 547). Dr. Cholnoky's attention was principally directed to the geotectonic structure of the regions visited, and he puts forward some new ideas with regard to the mode of formation of the present surface features, the origin of the laterite, and so forth. His investigations relate chiefly to three regions, viz. the plain between Hangchau and the lower Yang-tse; Southern Manchuria; and the region of the lower Hwang-ho. In the first of these, he paid particular attention to the geographical history of the Tai-hu lake, and his observations tend to refute the idea of Richthofen and Edkins that the Yang-tse once passed through this lake on its way to the sea. Even at low water the lake is decidedly above the level of the sea, to which it is drained in all directions, while Dr. Cholnoky's inspection of the line of ground between the alluvial plain of Tai-hu and that of Wu-hu on the Yang-tse, led him to conclude that, though traversed by an artificial canal, it has never been crossed by a river-channel since the deposition of the laterite. In Manchuria Dr. Cholnoky found that, as in China, the mountain chains have a north-east direction, while, as shown to be the case by Richthofen for the north Chinese ranges, only the Palæozoic strata are affected by the forces which raised the mountains. Two distinct lines of recent volcanic action were observed, one of these being marked by an extensive plateau of basalt, which occurs just in the same latitudes as the American trap plateau of Canada, Idaho, and Oregon. It occupies the whole upper basin of the Sungari, and is diversified by lines of basaltic volcanoes, which have the appearance of a continuous mountain range. The Chang-pei-shan range, along the north frontier of Korea, which cuts across the Sinic system from east to west, is certainly older than the latter, and Dr. Cholnoky is inclined to connect it with the Kuen-lun system. The existing maps of Manchuria contain many inaccuracies; even James's, which is the best, places O-mó-so 50 miles too far north. The river at Kirin is not correctly named Sungari, which name is used only after the junction with the Nonni. Its real name is Son-hoa-kiang. Between Mukden and Shan-hai-kwan, Dr. Cholnoky was struck by the vast plateau of abrasion, in which the streams have cut as deep channels as in the loess, while in his subsequent journey across the Hwang-ho to the Hwai range, he found similar characters in the plateaux traversed, and considers that these all belong to one system of recent marine abrasion, which extended from Liau-tung to Swa-tau, and even to Singapore. A remarkable fact is the association of the laterite with these plateaux of abrasion, the material of the former agreeing with the rocks of the latter in proportion to the nearness of the two. Dr. Cholnoky therefore suggests that the laterite, which cannot be the product of decomposition *in situ*, is due to a deposit, in sea-water, of atmospheric dust from a parallel zone of deserts, mixed with the products of abrasion. In the great Chinese plain, Dr. Cholnoky distinguishes the following three parallel zones: (1) the plateaux of abrasion; (2) the cones of detritus of the rivers; (3) the zone of the deltas. He devotes special attention to the second of these, which is the largest and most important, giving an impressive account of the cone of detritus of the Hwang-ho, the largest in the world.

Meteorological Observations in the Turfan Depression.—The well-known explorer, Roborovski, was commissioned by the Russian Geographical Society, a few years ago, to establish a meteorological station at the small town of Lukchun in the Turfan depression, and observations were taken regularly from December, 1893, to October, 1895. M. de Tillo gives, in the *Comptes Rendus* (1899, part i. p. 154), a summary of the results obtained, pointing out their great interest as relating to a region the most continental in the world, and yet with a negative altitude. He first gives the mean values of atmospheric pressure and temperature

observed for each month of the above-named period, afterwards showing the results obtained for the separate months by reducing the observations to sea-level, and making other necessary corrections. Side by side with these results, the values estimated by Buchan, in his report on atmospheric circulation issued in 1889, are shown. The principal conclusions are as follows: (1) The centre of high pressure occurs, during the months of November, December and January, in the Turfan depression, and not near Irkutsk; (2) the summer temperature is considerably hotter, and the winter temperature colder, in the Central Asian depression than has been estimated by Buchan; (3) the extreme annual range of the barometer yet known on the surface of the globe is that observed at Lukchun. In 1894 the difference between the means of pressure in January and July amounted to 1·1 inch, and in 1895, to 1·14 inch; while the maximum value, as given by Hann in 1897 for Semipalatinsk, was 0·73 inch.

Russian Expedition to Central Asia.—The Russian Geographical Society is fitting out, with the aid of funds supplied by the Tsar, a new expedition for the exploration of Central Asia. The expedition, the work of which is intended to cover two years, is to be under the command of Lieut. Kozlov, and will leave St. Petersburg at the end of the present month. It will make its way through West Mongolia and the desert of Gobi, will cross the Nan-shan mountains by Lake Koko-nor, and penetrate into the region lying round the upper waters of the Yellow river.

AFRICA.

The Great Nile Reservoir above Assuan.—The great undertaking to which the Khedive's assent was obtained last year, was publicly inaugurated on February 12 last, on which day the foundation-stone was laid by H.R.H. the Duke of Connaught. During the last few months the contractors, Messrs. Aird & Co., have made much progress with the necessary preparations for the work, and the first cataract is now the scene of bustling activity, no less than five to six hundred European officials and workmen being employed, while five thousand natives are at work quarrying and preparing the stone, which is obtained near the spot. The Nile at the first cataract is about a mile wide, and the channel is broken at low water by a labyrinth of rocky islets and ridges. It is on this foundation that the great dam will be built. It will be over a mile long, 80 feet wide at the base, and the top will be 90 feet above low water-mark. It will be pierced with one hundred and eighty sluices for the regulation of the flood waters, and will raise the level of the river for 140 miles above the first cataract. The chief consulting engineer, Sir Benjamin Baker, is said to have estimated that the work will be completed in two years, but other subsidiary barrages have to be constructed at Assiut and at Cairo, so that a longer time will be required before the whole scheme can be completely carried out. When this is done, a large area will be added to the cultivable lands of Lower Egypt, and even in Upper Egypt additional irrigation facilities will be secured at the time of high water. It is said that the ruins at Philæ will be in no way injured by the raising of the Nile level, for, according to the revised plans, this will be 18 feet lower than was originally proposed.

Journeys of Father Adams North and East of Lake Nyasa.—Two papers by Father Alfons Adams, apostolic missionary on Lake Nyasa, published (with maps) in the fourth number of the *Forschungen aus den Deutschen Schutzgebieten* for 1898, add to our knowledge of the districts north and east of the upper part of the lake. The first deals with the western parts of Uhehe, which Father Adams traversed by two different routes, afterwards proceeding south to the north

end of Lake Nyasa. He gives a general sketch of the physical features of the country, enumerating in particular the principal streams which, taking their rise in it, make their way north and west to the Ruaha. During the rainy season, which here lasts generally from November to the end of May, these streams overflow their banks, forming extensive swamps. The fauna of the region is particularly rich, though unevenly distributed; birds are especially abundant. Ubena, which occupies the western extremity of the district, is a gently undulating plateau, now almost devoid of trees, and in great part uninhabited since the last war. South of it lies the more elevated and mountainous district of Kirougi, occupying the water-parting between the headwaters of the Ruaha and Ulanga. Granite is everywhere the fundamental rock. The second paper describes a route from Manda bay, on the east shore of Lake Nyasa, across the southern Livingstone range to the region of the Luvegu, the southern tributary of the Rufiji. Although in part coinciding with Ramsay's route of 1894, it diverged considerably to the north, through the previously unvisited districts of Mgende and Upogoro, crossing and recrossing the Luvegu in the central part of its course. After passing through the mountainous country near the source of this river, Father Adams entered, by a series of descents, a more undulating district, broken, however, towards the north by the high table-topped summits of Keyu and Hani. The southern and western parts of Mgende are much cut up by gullies, washed out by torrents in the soft red and yellow sandstone. The whole country south-east of the Luvegu is uninhabited, and covered with light woods or bamboo jungle. Game is very scarce. The Luvegu flows almost entirely through a narrow valley, although near the junction of the Mbarangnandu, its largest tributary (from the south), it has low sandy banks and a considerable breadth even at mean water-level. Below this it is again hemmed in between well-wooded banks. Uporogoro is a romantic mountainous country with luxuriant vegetation, and of surprising fertility; it gives rise to various feeders of the Lorembero, which itself rises in the Sesse range, and joins the Ulanga above the mouth of the Luvegu. In its lower course it passes through a wide plain. During Father Adams' three weeks' stay at Isongo, which lies among the mountains at a height of 2500 feet, the whole landscape was wrapped, from 7 a.m. till midday, in dense mists, which rose from the lowlands of the Ulanga and Lorembero. The inhabitants are shy, and build their huts in rocky ravines or hollows, often accessible by a single passage only.

Ascent of Mount Rungwe, Northern Nyasaland.—The *Deutsches Kolonialblatt* for December 15 last contains the account of the ascent, by Herr von Elpons, commandant of the German station of Langenburg, of Mount Rungwe, the highest summit of the mountainous region north-west of Lake Nyasa. The way led at first over a broad grassy tract, with flowers and ferns often resembling those of Europe. An antelope, francolin, wild doves, etc., were seen here. As the ascent became steeper, deep gullies appeared on either hand, clouds obscuring the view. Forest and bamboo thickets were next traversed, and the party reached the foot of the final peak, the ascent of which was very steep. Ferns and brushwood still grew luxuriantly. The altitude was fixed by boiling-point observation at about 10,200 feet. Other high peaks were seen to the north, in which direction Mount Rungwe falls steeply into a gloomy cauldron-like valley, which had all the appearance of a crater. A rift 300 feet broad was seen on its floor, but to what depth it extended, or what was its character, could not be ascertained. The descent was made towards the south-west, but at nightfall the party found themselves in a narrow and deep ravine, where they were forced to spend the night without the means of cooking food, at a temperature of 43° Fahr. It was only after great difficulties that a way was found the following day, down an almost perpendicular wall of rock. The

whole mountain is saturated with moisture, and gives rise to numerous brooks and streams. The soil is deep black humus, in which bamboos grow to a very large size.

Map of the Interior of Togoland.—In 1896 a map of the southern portion of the German territory of Togoland was compiled by P. Sprigade on the large scale of 1 : 200,000, and issued with the third number for that year of the *Mitteilungen aus den Deutschen Schutzgebieten*. It embodied the results of all the surveying work done by German explorers up to that date, and gave a detailed view of the topography of the region dealt with. The same cartographer has now prepared (*Mitteilungen*, 1898, part 4) a map of the northern interior of Togoland, for which likewise a large amount of material is now available, thanks to the labours of the many German pioneers who have penetrated to the more remote parts of the territory. The routes are here, of course, less thickly strewn than further south, so that the scale of 1 : 1,000,000 amply suffices to show clearly the existing state of our knowledge, and even so, few parts of the African interior have yet been so thoroughly mapped. The map embraces the area between 7° and 13° north, extending to Say on the Niger in the north-east, and including on the west the whole of the neutral zone north of the Gold Coast, as well as the greater part of Mossi and Gurunsi in the French Sudan. All the routes of German travellers are shown, as well as the principal French routes; those of British officers behind the Gold Coast have, unfortunately, so rarely been published that, with the exception of those of the Mulatto Ferguson, they are not available. The work of exploration in Togoland has been of the systematic detailed character which fails to attract public attention by the presentation of geographical novelties, and on this account the publication of its results in a comprehensive form is of particular value.

AMERICA.

Mr. Low's Explorations in Labrador.—Dr. Dawson, Director of the Geological Survey of Canada, has received an interesting letter from Mr. A. P. Low, of the Survey staff, dated at Great Whale river, on the east side of Hudson bay, December 30. Mr. Low, whose exploratory work in Labrador has made his name well known, set out on the present mission early in June last. The letter tells of his safe arrival at Great Whale river, and of the successful completion of his survey of the eastern coasts of Hudson bay from Cape Wolstenholme southward to Great Whale river. Dr. Dawson had not heard from Mr. Low since the end of July last, when the surveyor left the Hudson bay steamer *Erik* in his yacht to enter upon his work. The last letter has just arrived in time for inclusion in the summary report of the survey now going through the press. It appears that Mr. Low has made an accurate log survey of about 500 miles of coast-line, of which about half is entirely new, never having been previously charted except in the roughest way. Mr. Low confirms the reports as to the existence of cod in the north-eastern part of Hudson bay, although he is unable to speak of the extent or value of the fishery. His letter contains further information respecting the valuable deposits of magnetic iron ores previously known to exist upon the shores of Hudson bay. He ends his account of the summer's work by stating that, having taken with him a pair of skis, he found them much better adapted for travel on the snow in that part of the country than the snowshoes ordinarily employed. He adds that the Eskimo in the vicinity of the Hudson bay post at Great Whale river are devoting themselves to making and learning to run upon skis. Mr. Low has planned to carry out some extended explorations in the Ungava region, in the latter part of the winter and before the opening of navigation. He hopes to continue his work in the northern part of Hudson bay before returning by way of Moose river. His letter reached Ottawa by

way of Moose Factory, Abittibi lake, and Lake Temiscamingue. Mr. Low, upon leaving Ottawa last summer, proceeded to Quebec, where he outfitted and took passage on the Hudson bay schooner which goes every year to Rigolet, on the Labrador coast, and there waited for the *Erik*, which comes from England. He went on the *Erik* to Nachvak, further north on the coast, where he had left his yacht upon returning from Hudson strait the previous year. The yacht was placed on the deck of the steamer and conveyed to Cape Wolstenholme, where Mr. Low parted company with the steamer and began his survey work.

Journey to the Mouth of the Mackenzie.—M. E. de Sainville, who between 1889 and 1894 made some extensive journeys in the extreme north of the North-West Territory of Canada, gives in the *Bulletin* of the Paris Geographical Society (part 3, 1898) some notes on the geography of the region of the Mackenzie delta, with a map which differs in many ways from former maps of the same country. Of the delta itself and the modifying agencies at work there, he gives the following account. The three main channels are united by a network of smaller ones, forming a number of low islands covered with firs and willows. At the breaking loose of the waters in spring, barriers of ice are formed between the islands, raising the level of the water, so that the estuary then has a width of 40 miles. As soon as the banks of sand and mud, which are brought down in enormous quantities, rise above the mean height of the water, willows begin to grow rapidly, and, arresting the passage of driftwood, give rise to the formation of new islands. This is now taking place to the west of Richard island, where was open sea during last century. East of the delta, M. de Sainville was able to correct the map of the Abbe Petitot, based for this part chiefly on native information. From the eastern branch of the Mackenzie a route leads by a series of portages to the Natoja river, which enters Eskimo lake, a deep expanse of water 30 miles by 5 or 6. It is discharged through a series of brackish lakes into the head of Hutchinson bay. The coast-line hereabouts is shown by M. de Sainville quite differently to its outline on our maps. The so-called Island of the Geographical Society seems to form part of the mainland, for Hutchinson bay has no connection either with Liverpool bay to the east or with the sea east of Richard island in the opposite direction. The whole of this neighbourhood is entirely composed of sand and ice, not a rock being seen even on elevations of 500 feet. Blocks of ice are often found 100 to 200 feet above the general level, and fossil remains of elephants are plentiful. M. de Sainville found the head of one in perfect preservation. The banks of the two rivers which enter the head of Hutchinson bay are covered with firs, similar to those which grow on the Mackenzie south of 68° 30′. This region, like the Mackenzie delta, is well to the north of the line usually shown as the limit of woods. M. de Sainville recommends Hutchinson bay as the best winter quarters along the whole coast, as the ice breaks up early, and he thinks that any expedition to the northern magnetic pole would do well to proceed to this bay by way of Bering strait, and, wintering there, start onwards in July. The paper includes some account of the mountainous region of the Peel river, west of the Mackenzie. The writer was able, after great hardships, to ascend almost to the source of the Peel, where it is a rapid torrent, and separated from the Yukon basin only by a portage of about 10 miles. Neither the map nor the account, however, gives any indication of the latitude reached. M. de Sainville concludes with observations on the natives, fauna, etc., of the country. The extremes of temperature recorded were 98° and −67° Fahr.

The Proposed Nicaragua Canal.—The preliminary report of the Nicaragua Canal Commission, relative to its progress in investigating the question of the proper route, the feasibility and cost of construction of the Nicaragua canal, has just been issued. With a view of making a complete and exhaustive report on the

subject, this commission visited Nicaragua, personally examined the entire canal region from ocean to ocean, and employed some seventy engineers, with their labourers and helpers, for ten months in making careful surveys and examinations of the canal region. Some meteorological and hydrological observers are still continued in Nicaragua, with a view to obtain a full year of observations of that nature. The required field work has been obtained, and its reduction, together with the compilation and comparison of former surveys, going back nearly fifty years, has been in progress for more than two months. The estimates for two of the best-known characteristic routes have been nearly completed. These routes are known as the Maritime Canal Company's route and the Lull route. A canal of smaller dimensions, sufficient only for present needs, is being estimated for. It is the opinion of the commission that, of the two routes mentioned above, the one called the Lull route is the more desirable, as it is easier of construction, presents no impossible engineering difficulties, and will be a safer and more reliable canal when completed. The commission believes that the construction of a canal across Nicaragua is entirely feasible.

Dr. Steffen's New Expedition.—The zealous explorer of the Andes of Patagonia, Dr. Steffen, started in November last on a new expedition, to complete the work previously done by him in those regions. A note in the *Geographische Zeitschrift* (1899, No. 2) announces the programme which Dr. Steffen sketched out for himself before starting. After examining the fiords of the coast between 46½° and 48° south in order to determine the best waterway into the interior, he hopes to follow the course of this stream, which may be expected to issue from Lake Buenos Aires, or some other of the partially explored lakes to the south. He also hopes to throw light on the connections of Lakes Cochrane and San Martin, the latter of which has lately been supposed to be drained into the Pacific ocean.

AUSTRALASIA AND OCEANIC ISLANDS.

Mr. Levesey's Journey in British New Guinea.—In his despatch dated November 28, 1898, the acting Administrator of British New Guinea, Mr. F. P. Winter, refers to a trip recently made by Mr. Levesey and his son into country not previously visited by Europeans. He ascended the so-called Tauri and Lakehamu rivers* (which flow into the Gulf of Papua in the vicinity of Port Chalmers) into the hills, and travelled over some mountain country at their heads. The Tauri had apparently changed its course more than once. There was excellent land on this river, and some large red cedar trees were seen near its upper waters. On the top of a hill, judged to be over 3000 feet high, a remarkable discovery was made of a large coral reef which stood out so clean cut, and so hard and solid, that it appeared as if it had only emerged from the sea a short time previously. Alongside the coral wall was a bank of sand containing fragments of coral and shells. On neither the Tauri nor the Lakekamu rivers, nor in the hills, did Mr. Levesey see the least trace of man after he had got beyond the district frequented by the coast tribes. Mr. Levesey went up the Biaru river, until he met with a tribe who called themselves the Omwom. So far as he could understand, these people were at one time settled on the coast, but were driven inland by the Gulf natives some time before this country became a British possession. They appeared hospitable.

The British Solomon Islands.—Mr. Woodford's Report on the British Solomon Islands Protectorate for the period January, 1897, to March, 1898, inclusive (Colonial Reports, Annual No. 251), is to hand. Two new items of export are included in the statement for 1897, viz. rattans, used in New South

* See Plan 4B, New Guinea Annual Report, 1892–93.

Wales for making coal-baskets, and plants, mainly consisting of an orchid (*Dendrobium speciosum*). The climate of the islands appears suitable for the growth of coffee; Savo is considered eminently adapted for this product. A well-equipped expedition visited the Protectorate during the past year from San Francisco, with the object of prospecting for minerals. They, however, met with little success, the mineral wealth of the islands having been falsely represented. The Solomon group is apparently free from hurricanes. The rainfall varies considerably in different localities. Maran sound, at the south-east end of Guadalcanar, is, during the south-east season, probably one of the wettest coast places in the Protectorate; this is, no doubt, owing to the configuration of the island. On the other hand, the Government station at Tulagi hardly has its due share of rainfall. The greatest quantity of rain registered in one day at Tulagi was 4·93 inches on March 1. The highest temperature registered by Mr. Woodford at or near sea-level was 92°, while the lowest night temperature registered at sea-level, on the north coast of Guadalcanar, was 74°. The Government buildings are now practically completed. A Protectorate has been proclaimed over the islands of Rennell, Bellona, and Sikiana, or Stewart island, and are now included in the British Solomon Islands Protectorate.

The Exploration of the Ottilien River, German New Guinea.—We have already announced that the expedition sent to explore the Ottilien river in German New Guinea, has been successful in proving the identity of that stream with the Ramu, discovered in the interior by Dr. Lauterbach. Lieut. Tappenbeck's report on the proceedings of the expedition has lately appeared in the issue for 1898 of the *Nachrichten über Kaiser Wilhelms-Land*, and the most important sections of the report have been reproduced in the first number of the *Verhandlungen* of the Berlin Geographical Society for the current year. The bar of the Ottilien was safely crossed by the steamer, with a depth of 13 feet, on April 13, 1898. The banks were found to be quite level, and covered with dense vegetation, casuarinas being at first abundant, but giving place later to Nipa palms. No suitable spot for a station could be found. There are no permanent villages on the lower course of the stream, only shelters erected by natives from the interior while on fishing expeditions. The current is here extraordinarily strong, and the average depth in the channel 26 feet. On the second day natives were seen, whose canoes resembled those of the upper Ramu. On the third the forest became higher, and gave the impression that the soil was less damp. Many crested pigeons were seen, while in the mornings and evenings birds of Paradise were heard in large numbers. On April 18, the first coconut palms were seen, and a village was soon reached, which the leader thought to be the turning-point of the former expedition. This was to some extent confirmed by the fact that the natives at once took to flight when Lieut. Tappenbeck took up a carbine after the manner of a walking-stick, without making with it any threatening demonstration, which showed that they were acquainted with firearms. This was the furthest point reached, as the steamer appeared too heavily laden for a further advance against the strong current. It was, however, proved that a vessel of 9 feet draught can navigate the stream for a distance of at least 110 nautical miles, for the repeated groundings were due to ignorance of the course of the deep channel, and can be avoided after this is laid down by more careful surveys.

POLAR REGIONS.

Mr. Borchgrevinck's Expedition.—Telegraphic intelligence from New Zealand, received in this country on March 17, announces the arrival of the *Southern Cross* at Port Chalmers, having landed Mr. Borchgrevinck and his party, eleven in all, at Cape Adare, Victoria land.

The Andrée Expedition.—At the request of Prof. Nordenskjöld, the King of Sweden and Norway has provided Mr. F. R. Martin with 1500 kroner to enable him to conduct a search for Herr Andrée in Siberia. Mr. Martin has already started his journey.

GENERAL.

Sebastian Cabot.—In Mr. Winship's letter on "Sebastian Cabot," p. 208, line 15 from bottom, for *source* read *power*.

OBITUARY.

Sir George Ferguson Bowen, G.C.M.G.

Another of the great colonial governors whose names are so intimately connected with the early days of the British settlements in Australasia, has passed away in the person of Sir George Bowen, who succumbed to bronchitis after only two days' illness on February 21 last. The deceased was one of our older members, having joined the ranks of the Society forty-five years ago, and being a contemporary on its roll of our present President and of Mr. A. R. Wallace. He occasionally took part in discussions at the evening meetings, and served on the Council from 1889 to 1892.

Sir George Bowen's connection with Australia did not begin in early life, for after a distinguished career at Oxford, where he was twice President of the Union, he was in 1847 appointed President of the University of Corfu, that island being then, like the rest of the Ionian islands, a British Protectorate. This was the beginning of a period of work in Eastern Europe, during which he was called upon to play an important part in the affairs of that region. In 1858, as secretary to the Government of Corfu, he was associated with Mr. Gladstone in the inquiry into the constitution of the islands, which led to the adoption of various reforms in the government, though not immediately to the wished-for union with Greece. For his services in Corfu Bowen was made a K.C.M.G., and in 1859 was appointed Governor of Queensland, then first raised to the rank of a separate colony.

In this sphere, which contrasted so strongly with that he had just left—although he found many analogies between the life and surroundings of the settlers and those depicted by the classical writers—Bowen proved equally successful, attacking the problems which there faced him with characteristic enthusiasm and untiring energy. His sympathy with all classes made him universally popular, and on the expiration of his proper term of office his tenure of it was prolonged for two years. Among the subjects that especially engaged his attention, pioneering work and the formation of new settlements naturally took an important place, and in connection with these objects geographical exploration found in him a ready sympathizer. The exploration of the Burdekin river, the various expeditions in search of the missing explorers Burke and Wills, the formation of the new settlement at Rockingham bay, with explorations in its neighbourhood, all belong to the period of Sir G. Bowen's governorship, while he himself took part in an expedition which led to the formation of a coaling-station and settlement at Cape York.

In 1867, on the retirement of Sir George Grey from the Governorship of New Zealand, Bowen was appointed his successor, and by his tact and conciliatory attitude succeeded in completing the pacification of the islands after the second Maori war. He subsequently held similar appointments in Victoria, Mauritius, and Hong-Kong, in all of which he proved himself a successful administrator. His tenure of office at Hong-Kong included the period of the Franco-Chinese war,

which rendered necessary the utmost vigilance and tact on the part of the Governor of the British settlement. On his return to this country in 1885, he was sworn a member of the Privy Council, and his last public service was the inquiry into the working of the new constitution at Malta, which he carried out in 1888, in conjunction with the late Sir G. Baden Powell, and for which he received the thanks of the Queen.

Sir George Bowen married, in 1856, the daughter of Count Roma, President of the Ionian Senate, and after her death in 1893, married a second time in 1896.

Sir R. Lambert Playfair, K.C.M.G.

We record with much regret the death of Sir Lambert Playfair, which took place at St. Andrew's on February 18 last, at the age of seventy years. Although not a professed geographer, Sir Lambert was one of those public servants whose long residence in foreign countries gives them exceptional facilities for observation, and who, by making the best use of their opportunities, are able to shed valuable light on the countries and peoples with whom they are brought in contact.

Sir Lambert Playfair was a native of St. Andrew's, being the son of the late Dr. George Playfair, and grandson of Principal James Playfair, of St. Andrew's University. His foreign service began at the early age of eighteen, when he entered the Madras Artillery. While still a lieutenant in that force, he was chosen by Sir James Outram as his assistant when, in 1854, the latter took up his duties as first political resident at Aden. Playfair had already qualified as an interpreter in the Arabic language, and he put his residence at Aden to good account by researches into the history of that part of Arabia, which were embodied in an official publication forming a part of the Bombay series of records. The volume contains an account of the ancient reservoirs at Aden, the restoration of which was commenced during Playfair's residence at the place. He also took his share in the measures for putting down the traffic in slaves between Arabia and Somaliland, and in the events connected with the British occupation of Perim. In 1863 he became political agent at Zanzibar; and in 1867, on retiring from the army with the rank of lieut.-colonel, became Consul-General at Algiers, holding that office until his retirement in 1896. During this long period he acquired an extensive knowledge, not only of Algeria, but of the Mediterranean countries generally, journeying, among other places, in the Balearic isles and in Tunis, where, in 1876, he visited the previously almost unknown Khomair country. In 1878 he contributed to Murray's series of handbooks the volume on 'Algeria and Tunis,' which was acknowledged to be one of the best so far issued; and in 1880 he described for the same series the Mediterranean generally, with its cities, coasts, and islands. Both these have passed through several editions. His official reports likewise contain much interesting information: that on his visit to the Isle of Jerba, the dates of which are identified by him with the lotus of Homer, deserves special mention. During his residence at Algeria, he paid much attention to the history of early British relations with that country, and in 1884 described the same in his volume, 'The Scourge of Christendom,' based largely on official documents.

At the British Association Sir Lambert Playfair, besides his address as President of Section E at Leeds in 1890, on the Mediterranean, Physical and Historical, gave several papers, describing his travels or discussing the political condition of Algeria and Tunis. But his most valuable service to geography was perhaps the compilation of the series of exhaustive bibliographies of the Barbary States—a work

of great labour—published in the Supplementary Papers of our *Proceedings*. He had joined our Society so far back as 1860. Since his retirement in 1896 he had resided at St. Andrew's, for which he always expressed an enthusiastic preference to all other towns in Europe, occupying his leisure hours by writing down his varied reminiscences of life in Asia and Africa. Two instalments have appeared in *Chambers's Journal* for the current year, one of which tells—for the first time, it is said, correctly—the story of the British acquisition of Perim island.

Of Sir Lambert Playfair's private life and character we cannot here say much. It can only be remarked that his genial and kindly nature made him a general favourite, and that his loss will be widely regretted. He is survived by Lady Playfair, several sons, and a daughter.

William Frederick Webb.

William Frederick Webb, who died at Luxor in February last, was born in 1829. On leaving Eton he joined the 17th Lancers, but soon went to South Africa, where he became well known as a successful and daring sportsman at a time when big game was still plentiful on the plains outside the limits of the Colony, in regions that have now become mining centres, and from which the game has been necessarily expelled. It was while thus engaged that Webb first made the acquaintance of Dr. Livingstone, then a missionary among the Bechuana tribes, and thus was formed a friendship that continued without interruption to the last.

When Livingstone came back to England in 1864, from his second great expedition, his friend Webb, now the owner of Newstead Abbey, induced him to make that historic mansion his home. There, as the guest of Mr. and Mrs. Webb, he spent eight of the happiest months of his life, writing an account of his explorations, and planning his last journey, which resulted in the discovery of the headwaters of the Congo.

For thirty-seven years Mr. Webb had been a Fellow of this Society, and had devoted much of his time to travel. There were few parts of Asia, Africa, or America which he had not visited either for sport or amusement.

John M. Cook.

Mr. J. M. Cook, head of the world-famed firm of travelling agents of that name, died at his house at Walton-on-Thames on March 4. The deceased gentleman had been associated with the firm since its removal from Leicester to London in 1864, and took an important share, together with his father, the founder of the firm, in the building up of the business to its present proportions. He had been for nearly nineteen years a member of our Society, and may be said to have done much for the popularization of geography, by the greatly increased facilities for foreign travel which have resulted from his persevering efforts. The greatest achievement of the firm was, perhaps, the provision of the transport arrangements for the Nile Expedition of 1884–85, which was placed entirely in its hands by the British Government. The arrangements connected with the German Emperor's visit to Palestine were last year placed in Mr. Cook's hands, and an illness by which he was attacked in Jerusalem resulted in an undermining of his health, from which he never completely recovered.

CORRESPONDENCE.

The Source of the Oxus.

In a paper in the *Geographical Journal* for January, entitled "The Proceedings of the Pamir Boundary Commission," whose excellent published narrative it reviews, there occurs a passage which should not, I think, be allowed to pass altogether without comment. The writer is speaking of the recorded observations of the English members of that commission in the neighbourhood of Lake Chakmaktin, on the Little Pamir. This is the lake from the eastern end of which flows the Aksu or Murghab branch of the Oxus; while from the low plateau at its western extremity a pretty rivulet, fed from a neighbouring ravine, flows down and joins the Wakhan-daria, or main stream of the Oxus, below Bozai Gumbaz. It was once reported that Lake Chakmaktin had both an easterly and a westerly outflow, but all recent explorers, from the time of Gordon in 1874 onwards, while noticing the exit of the Aksu, have failed to observe any similar phenomenon at the western extremity of the lake. The members of the Boundary Commission, however, in August, 1895, found that a stream which they call the Chilab stream, and which is the easternmost source of the Little Pamir or Sarhad branch of the Oxus, already spoken of, was divided near the lake into two channels, one of which discharged eastward into the lake, while the other flowed westward down the valley towards Bozai Gumbaz. As this Chilab stream rises in the mountain range separating the drainage of the Little Pamir from that of the Great Pamir; as from the other side of this watershed spring the feeders of Lake Victoria; as, according to the above observations, the Chilab feeds both the Little Pamir branch of the Oxus and Lake Chakmaktin; and as the latter is the admitted source of the Aksu, the writer of your article arrives at this conclusion: "Surely, then, the true source of the Oxus lies amid these glaciers, for no single affluent can compete with these three combined."

I am afraid that this ingenious edifice of inference will hardly stand the test of examination. For that the Chilab stream, which the commissioners found to be connected by a channel with Lake Chakmaktin, is ordinarily so connected, is disproved by the observations of all previous travellers. I made a most careful examination of the marshy ground and the low plateau at the west end of the lake when I was there in September, 1894; and not only can I aver that there was no water either flowing into or out of the lake at its western extremity, but there was not a drop of water in the Burgutai gorge itself, down which the Chilab stream flows from what is now called the Nicholas range. That stream is the uppermost affluent of the Little Pamir or Sarhad branch (a very insignificant one) of the Oxus. It is frequently empty itself. It can only be at times of exceptional water, then, that any portion of its contents overflows to the east and makes its way into the lake. To base upon this transient and accidental occurrence the contention that in the glacier sources of the Chilab, which are also on the different side of the watershed from those of the Lake Victoria or Pamir river drainage, lie the head springs of the Oxus, seems to me, I confess, a very disproportionate deduction from wholly inadequate premises. A source of a river can hardly be that which is ordinarily and habitually dry. That Lake Chakmaktin, and not the Chilab stream from the Nicholas glaciers, is the parent of the Aksu I hold, therefore, to be incontestable. Moreover, that the true source of the Oxus lies in the glacier springs of the Wakh-jir, below the Wakh-jir pass, has never, I believe, been doubted by any one who has visited that spot, and was, I think, sufficiently demonstrated in a monograph, entitled "The Pamirs and the Source of the Oxus," which originally appeared in the pages of the *Geographical Journal* in 1896.

CURZON OF KEDLESTON.

Calcutta, March 1, 1899.

*The Proceedings of the Pamir Boundary Commission.**

It was just five and twenty years ago that I had the satisfaction of proving, by personal observations in the Pamirs, that the lake of the Little Pamir (or Chakmaktin, as it is now called) had, contrary to the general belief of geographers, only one outlet, and that eastward, and that its waters flowed into the Ak-sú, afterwards the Murghab, which joins the Oxus near Wamur, and is in all probability the longest branch of the Oxus.† The importance of this discovery in the then state of political geography was very considerable, on account of the disputed boundary between Russia and Afghanistan, in the neighbourhood of the upper waters of the Oxus.

I now learn, to my surprise, that the writer of the article on "The Proceedings of the Pamir Boundary Commission," which appeared in the *Geographical Journal* of January, 1899, attempts to gainsay this discovery.

He writes as follows: "Early explorers represented the lake as having two outlets—one eastward to the Aksu, and the other westward to the Ab-i-Punja. Later explorers maintained that the lake drained only to the eastward, and that it was the source of the Aksu-Murghab river only. Neither view is entirely correct, though the former perhaps more nearly approaches the truth than the latter."

This latter statement is absolutely contrary to the facts of the case, as I shall proceed to prove. The sole grounds on which it is based is that a stream coming from the so-called Nicholas range, divides into two portions close to the western shores of Lake Chakmaktin, one portion flowing *into* the lake and passing out again into the Aksu, and the other flowing westward into the Ab-i-Punja. This division of the drainage is said to occur in the marshy swamps which border the lake.

Now, admitting the fact thus stated, it clearly proves the contrary of what the writer deduces—one portion of the divided stream pours *into* the lake and out at the *eastern* outlet, the Aksu river; while the other portion flows into and, in fact, forms the extreme headwaters of the Ab-i-Punja, or Wakhan river; but not a drop of water flows *from* the lake into the Ab-i-Punja, although, from the somewhat distorted map accompanying the paper (in which each of the two branches into which the stream divides is made much larger than the parent stream), it would appear that there is a large flow of water from the lake into the river.

To those who are interested in the subject, I would recommend the perusal of p. 204 of the R.G.S. *Journal* of 1878, vol. xlviii. It will there be observed that, not completely satisfied with my laborious examination of the ground under circumstances of exceptional difficulty, I deputed the native officer of our escort (the Resseldar Mahommed Afzul Khan, who subsequently came to England in attendance on H.R.H. the Prince of Wales) to make a fuller examination later on in the year. In doing so, he rode completely round the bend of the west end of the lake up to the foot of the steep mountains rising on the south side. The snow was then all melted, and water was flowing *into* the lake from the two sources I had described in my paper, but there was no outlet westward. On proceeding to the east end of the lake, he found a large stream of water issuing from it eastward—the headwaters, in fact, of the Aksu river. Now, as regards the two streams flowing into the west end of the lake, one was derived from hot springs; the other (which I had described in my paper as a frozen stream, on which, going along westward, the barometer showed I was working uphill) is, I have no doubt, identical with that portion of the divided stream alluded to by the writer of the article in the *Journal* as flowing into the lake.

* See *Geographical Journal*, January, 1899.

† *Vide* R.G.S., vol. 48 (1878), pp. 204 and 205.

I may mention that this division of a stream into two parts flowing in different directions is by no means *unique*. An exactly similar case occurs at the watershed east of the Victoria lake, notice of which will be found on p. 221, R.G.S. *Journal* of 1878, where I state, "A frozen stream here comes down from the north, divided into two portions by a low ridge of gravel, one flowing eastward into the Aksu river, the other westward into the lake.

Before laying down my pen, there are some other matters in the article under review in which I am personally interested, and on which I should like to enlarge.

Every explorer likes to discover something fresh, and, I fear, sometimes to pick holes in the work of his predecessors. Now, when a lake such as Chakmaktin, surrounded on all sides by lofty snow-covered mountains, is described as one of the principal sources of the Oxus, it is obvious that its principal supply of water must come from the melting of the snow and of such glaciers as may be lying in the recesses of the surrounding mountains—*ça va sans dire*—and it can hardly be considered as a new discovery, as seems now to be claimed, that the waters of the Oxus are derived from such a source.

I had a passage-of-arms at one of the R.G.S. meetings some years ago with the present Governor-General of India, who claims that he discovered the main sources of the Oxus in an altogether different locality, viz. the Hindu Kush mountain range. Although his lordship had much to say on behalf of his theory, I think it is still an open question as to whether that branch of the Oxus flowing from the Little Pamir lake—known afterwards as the Aksu, and later on its course as the Murhabi—is or is not the principal feeder of this interesting river.

The Murghabi river meets near Kila Wamur, in Roshan, that branch of the Oxus which, known as the Punjah or River of Wakhan, carries away the drainage, not only of the Hindu Kush, but of the Victoria lake region. This junction was visited in the spring of 1874 by the "Munshi," a native surveyor attached to the Forsyth Mission, and I quote from my report (p. 215, R.G.S., 1878): "The Munshi crossed the river (Murghabi) about 200 paces above its junction with the Punjah; the stream was in three channels, and the torrent was so rapid that most of the horses lost their footing. The Punjah stream was very clear, but the Murghab was red, thick, and muddy. The volume of the latter was considerably larger and its velocity greater than that of the Punjah. From bank to bank the width of the river-bed is about 1½ mile, and of this at least a mile was covered with water. The passage was effected with great difficulty. In the summer floods the water is said to extend from mountain to mountain, a distance of not less than 5 miles; it can then only be crossed by boats."

I am aware that this is not conclusive, and I believe Lord Curzon has the evidence of another reliable eye-witness that at a different period of the year the Punjah river was the greater of the two. I have been endeavouring lately, but I am sorry to say without success, to obtain from Russian sources the results of more recent observations.

It may be interesting to know that the "Munshi," who was a Mohammedan native of Kashmir, was subsequently employed by my former chief, the late General J. T. Walker, on further exploring operations in dangerous places in Central Asia. From the last of those he never returned, and he was long mourned for in India as a martyr to science, but some years later on, during the Afghan war, my old friend Sir Thomas Holdich came across him in Afghanistan commanding the Ameer's artillery!

In the article under review, I observe that my name is twice mentioned in connection with serious discrepancies, in heights and other elements, between the

results of my work and those of the Pamir Boundary Commission. As I do not wish to go down to posterity as an inaccurate or careless observer, I feel it incumbent on me to make some observations on this subject.

Firstly, as regards the altitude of Victoria lake, which Wood, its original discoverer, made to be 15,600 feet above sea-level; my observations made it 13,950 feet, whereas the Pamir Commission estimate it as 13,390 feet. I willingly accept the correction as final, until a fresh generation of observers makes some further change. It appears that the height has been trigonometrically fixed from the Indian side, and that it is in agreement with the barometrical determinations of the Russians. The reviewer very fairly remarks that my observations were made in the unsettled spring weather, when single barometric determinations are of little value.

On the occasion of our excursion to the Pamirs, the only mercurial barometer that survived the journey across the Himalayas had to be left at our headquarters at Yarkand, and the instruments with which my observations were made were two aneroid barometers and a hypsometer. The former, even the best of them, are sadly unreliable and apt to change their index error; the hypsometer is a very unsatisfactory instrument to use in a gale of wind or in a blinding snowstorm. I will willingly admit corrections to any of my height determinations on the trip to Wakhan and back to Kashgaria, made by skilled observers with superior instruments and with more time than I had at command; but my height determinations of Yarkand and Kashgar are of a different class, being based on observations with mercurial barometers, extending over a long period of time, and carefully reduced to the base station at Leh, in Ladakh, where, during my absence from India, regular barometric observations were systematically taken under the direction of the late Mr. Shaw.

In my published report on the survey work of the Yarkand Mission were given some very carefully prepared diagrams, showing not only the curves of the mean barometrical diurnal variation at Yarkand and Leh, but also showing a comparison between the barometric waves at Kashgar, Yarkand, Leh, and Deira Doon (the headquarters of the Great Trigonometrical Survey of India) during the months of December, 1873, and January, February, March, 1874. These last showed very interesting and important results; the waves, as shown in the diagram, at Kashgar and Yarkand were almost identical—a result to be reasonably expected, from their similar position in the great plains of Kashgaria. The wave at Leh observatory, 11,538 feet above sea-level (distant as the crow flies about 300 miles south of Yarkand, and separated from it by several mountain ranges) showed a very remarkable series of elevations and depressions, corresponding in the main with those at Yarkand and Kashgar, but generally occurring two days after those at the last-named stations. Several of them were again to be traced, but not in so regular a manner, at Deira Doon, at the foot of the Himalayas, some 270 miles south of Leh, the periods of depression and elevation according fairly with those at Leh.

These observations would tend to show that, although the comparison of the mean barometrical readings for this period of four months would probably furnish very accurate data for the difference of height between Leh (which has been determined by trigonometrical methods) and Yarkand, yet that a calculation based on a single day's observation might give very erroneous results, amounting on one particular day (January 12) to a difference corresponding to six-tenths of an inch in the height of the mercurial column, an amount considerably exceeding the difference between my determination of the height of the Victoria lake with that of the Boundary Commission. As a matter of precaution, however, all heights

on our Pamir expedition were calculated with Yarkand Observatory as a base station, at an estimated height of 3923 feet above sea-level. This would lessen the chance of error.

And now to another and still more interesting question, viz. the position and height of the highest mountain north of the Himalayas.

It will perhaps be recollected by those who have read my paper in the R.G.S. *Journal* of 1878, that I alluded to receiving, while at Yangi-hissar, a budget of English letters, and that on opening the last file of the *Times* I was astonished to find a letter from the Berlin correspondent of that journal, arguing that a railway might without the slightest difficulty be constructed from the Oxus basin to that of the Tarim in the approximate latitude of 39°, and that I glanced up from my paper as I read, and in the exact spot indicated I saw vast inaccessible (to me), apparently unbroken mountain masses covered with perpetual snow, and rising to a height of more than 20,000 feet.

Now, the *Times* correspondent was certainly somewhat behind the times, but even if he had been better informed he could only have known that there was a big mountain range lying west of the line Yarkand to Kashgar, unless, indeed, he had read Hayward's paper in the R.G.S. *Journal* (which I have not by me to refer to), where he would have learned that there was in this range a high mountain peak called Tagharma.

There appear to be doubts as to the accuracy of the position assigned by me to this Tagharma peak, whose height above sea-level I estimated to be 25,350 feet. The position given for it in my map can, of course, only be regarded as approximate, and must at once give way to any modern scientific survey conducted either by Russians or Englishmen; my only means of fixing its position was by bearings taken with a prismatic compass from Yangi-shahr (Kashgar) and Yapchan, positions some 13 miles apart from each other, and distant 80 and 73 miles respectively from the mountain in question. The relative positions of and distances between the ends of the base were also solely dependent on prismatic compass bearings taken surreptitiously by a native surveyor, who calculated the distance by the number of his paces. The position of the starting-point, Kashgar, is also a further element of uncertainty, depending entirely, both as to latitude and longitude, on my own astronomical observations at that place. Its latitude may be taken as absolutely correct.

After allowing for the different posts of observation, the difference between my astronomically determined longitude of Kashgar and that of the Russian Colonel Scharnhorst (in 1872) is somewhat less than 2 miles, the position assigned by me being that distance in excess, *i.e.* to the east of the Russian value.

Unfortunately, Kashgar and Yapchan were the only places from which I could get a view of the mountain. Owing to haze, it was never visible from any place that I visited further south. Had I been fortunate enough to have had a clear day at Yangi-hissar or elsewhere, its position could have been determined with much greater accuracy.

To any one familiar with the subject, it is evident that what with the rough measurement of the base, the instrument used, and the very acute angle of the triangle at Tagharma peak, the position fixed for the latter can only be considered as approximate, and must at once give way when put in comparison with the result of more scientific survey.

As regards the estimated height, my value is based on observations taken from the same two points with a small but very good 6-inch altazimuth instrument, and I confess I am surprised and disappointed that there is apparently so great a discrepancy between my results and those obtained by the Pamir Boundary

Commission, but it is as yet by no means certain that the Muztagh Ata to which observations were taken by them is the same mountain that was observed by me. When at Tashkurghan, on my way to the Pamirs, I got a view of the Muztagh Ata, and took bearings to it, but I was in so much doubt about its being my old friend the "Tagharma," that I decided later on not to make use of the observations I had taken at Tashkurghan.

I shall be indeed pleased when the Russians complete the survey of this part of the world, and set at rest the interesting and apparently still undecided question as to the height and geographical position of the highest peak of the Kizilyart range.

The reviewer states that the most northern of these high peaks is in lat. 38° 35′, and believes this to be my Tagharma peak, to which I had myself assigned a position of 38° 35′ 15″ N. lat. and 75° 22′ 47″ E. in longitude; but I can state positively that there is another double-headed peak visible from Kashgar, situated about 23 miles north of the Tagharma, whose altitude I estimated at 22,500 feet.

On the other hand, the Russians have applied a height of 25,000 feet to another mountain further south, called the Muztagh Ata (the one presumably which I saw from Tashkurghan), which the Boundary Commission have now scientifically determined to be 23,480 feet high. I think it very probable that it will eventually turn out that the Muztagh Ata and the Tagharma peak are one and the same mountain, an opinion I once held, but subsequently discarded. This was also the opinion of Colonel Gordon (now General Sir T. Gordon), the chief of our mission to Wakhan; in fact, he never had any doubts on the matter, and in his 'Roof of the World' he gives a full-page picture of "The Muztagh (Tagharma peak) from Tashkurghan, Sirikol, looking north," and, further, in his letterpress says, "We had a glorious view from our camp in the Sirikol valley of the majestic Tagharma peak (known then as the Muztagh "mountain of ice") about 40 miles to the north, towering to a height of 25,000 feet, as estimated by Captain Trotter. It looked a perfect mass of snow and ice, and glistened with numerous glaciers."

I have not yet had an opportunity of seeing the Report of the Boundary Commission, but hope shortly to do so.

Before closing this letter, I should like to make a brief allusion to another question dealt with in the January number of the *Geographical Journal*. In the Monthly Record, in dealing with Mr. Cobbold's journey in Central Asia, it is stated, "From Kashgar he crossed the Tian Shan range by the Turgat (Tur Agat) and Tash Rabat passes and Lake Chatir Kul, to the Naryn valley, and finally to Lake Issyk Kul. In this section of his route, he was, we believe, on ground not previously visited by an Englishman, though known from the explorations of Russians and other travellers."

Now, it is a sad reflection to think that one should outlive the memory of one's deeds. Such is, I fear, my case; I cannot refrain, then, from bringing to notice that on p. 192 of the oft-quoted volume of 1878 will be found a description of my journey by the Turgat pass to Chadir Kul in January, 1874, in company with Colonel Gordon and Captain Biddulph. In Gordon's 'Roof of the World' will be found (p. 64) an admirable panoramic view of the Chadir-Kul lake in the Tian Shan plateau, "Russian Frontier: wild sheep in the foreground."

I have a very vivid recollection of this trip, for three special reasons—

1. It was, I think, the coldest journey I ever performed in my life.

2. The country traversed was the scene of the greatest humiliation and mortification that I ever experienced. All three members of our party were very keen sportsmen, and we were for the first time in the country of the *Ovis Polii*,

no specimen of which had, up till then, fallen a victim to an English sportsman. I was the first to spy a large flock, and I made a long and most successful stalk, my rival Colonel Gordon watching me all the time from the crest of a neighbouring ridge. I got within about 70 yards, fired, and missed! I recollect it as if it were yesterday. The weapon was one to which I had not been accustomed, with a very high trajectory. The sheep were out of sight before I could reload, and neither I nor any others of the party ever got another chance in that part of the country, although some months later on I partially retrieved my reputation while in the Pamirs by shooting from the road, while on a long and dreary march of 37 miles, the firs specimen of this famous sheep ever killed by an Englishman.

3. My third reason is perhaps more worthy of the columns of your *Journal*, and with it I hope to conclude this rambling letter.

In these modern days it has more than once happened that British and Russian officers have met together in a friendly way to lay down disputed boundaries, and thus scientific and accurate geographical determinations of the position of various places in Central Asia have taken the place of former doubtful values; but this expedition to Chadir Kul made me the pioneer of the more scientific work that has followed. The survey-link connecting Kashgar and Chadir Kul was the first piece of work common to Russian and English geographers. The Russians, I believe in 1872, astronomically determined the position of the east end of Chadir Kul lake, and made a rough route survey of the above-mentioned link; they also in the same year took astronomical observations at Kashgar. In the following year I took astronomical observations at Kashgar, and made a route survey thence to Chadir Kul, and when I returned to India and worked out the results of my observations at Kashgar, and plotted in my route to Chadir Kul from my own determination of Kashgar, I found that, adopting the Russian value in latitude of the east end of the lake, our positions in longitude of the same point almost exactly coincided.

To appreciate the satisfaction I felt at this result, it must be recollected that at the time of which I write the wildest discrepancies existed in all maps, both Russian and English, as to the positions of large and important towns in Turkistan. One of the results of my work was to shift the position in longitude of Khotan 33 miles to the east of the position hitherto assigned to it both in English and Russian maps. I put it in 79° 59′ instead of 79° 26′. I may note that at about the same period Russian geographers shifted the cities of Aksu and Kurdja some 40 miles to the east of the positions hitherto assigned them.

By a curious coincidence, the *Geographical Journal* of January refers yet again to another matter connected with the survey work of the Forsyth Mission of 1873–74. I allude to the paragraph about Captain Deasy's travels in Central Asia (p. 65), where he is stated to have discovered the sources of the Khotan river in lat. 35° 35′ N. and long. 81° 40′ E.

Referring to the map which was prepared to accompany my paper in R.G.S. *Journal* of 1878, I find, in the projection of Kishin Sing's route-survey from Khotan to Leh *viâ* Polu, that in lat. 35° 3′ and long. 81° 30′ his route crosses a stream, the waters of which are shown by a dotted line to flow into the Khotan river. That stream evidently takes its rise in the mountain chain faintly shown on the map as lying to the immediate east of Kishin Sing's route, and it is probably in that range that Captain Deasy has come across the sources referred to. The position assigned by Captain Deasy to the sources of the Khotan river coincides almost exactly with the spot marked Aksu in the map, which is on the upper waters of the Kiria river, as shown by Kishin Sing.

I have always placed great confidence in the Pundit's work, for the reasons given on p. 223 of my paper referred to, especially in the correctness of his latitudes, and it will be seen, from the printed report on the Yarkand Mission Surveys (p. 21 of 'Abstract of Latitude Observations'), that sextant observations for latitude were taken at Arash, south-east of Aksu, on the nights of July 12 and 13, 1874, with very accordant results, making the latitude of that place 35° 29′ 54″, which may be taken as within a few seconds of the truth, and I think it by no means impossible that it will ultimately be shown that Captain Deasy mistook the head-waters of the Kiria for those of the Khotan river.

On the other hand, the Pundit's work showed that his route was crossed by a stream flowing into the Khotan Darya about 30 miles to the south of the position determined by Captain Deasy. I would rather hope, therefore, that, owing to discrepancies in longitude (which is far more likely than in latitude), it may turn out that both explorers were correct in their hydrography, in which case Captain Deasy's river will be found to run a southerly course for some 30 miles before flowing to the west.

I must apologize for the length to which this paper has extended; but when I took up my pen I found that my geographical zeal of a quarter of a century ago, although lying long dormant, is still strong in my system and required an outlet. I trust that the matter that has flowed through it will have convinced my readers of the correctness of my original views as regards the drainage of the Little Pamir lake.

HENRY TROTTER, Lieut.-Colonel.

Galatz, Rumania, February 20, 1899.

Hannibal's Pass.

There are two statements in Mr. Westlake's paper on this subject in the last *Journal* that I venture to correct, as they may mislead the weaker brethren.

1. He states that Varro informs us that Hannibal used the Col de l'Argentière, and Hasdrubal the Mont Cenis. Of course, in neither case does Varro *name* the passes by which these two generals crossed the Alps; if he had, much, much ink would have been saved. It is merely a theory that the passes mentioned by Varro can be so identified, or are given in topographical order. As to the Mont Cenis, I am, and always have been, quite incredulous. The earliest clear and distinct mention of this pass by name is in the eighth century A.D., while the valley of the Arc (or Maurienne) which leads up to it on the Savoy side seems to have been completely unknown to the Romans, and appears in authentic history only in the sixth century A.D. Of course, the Mont Cenis *may* have been used earlier, but we have absolutely no evidence of any kind that it was crossed before the eighth century A.D. I may add that I am perfectly acquainted with Mr. Freshfield's arguments to the contrary, which were published in the *Alpine Journal* when I was editor of that periodical, and seem to me quite inconclusive on this point. I also know the Mont Cenis very well.

2. Mr. Westlake contrasts "the rich plains between the foot of the Argentière and Turin" with the narrow valley of the Dora Riparia, descending from the Mont Genèvre. Now, I have often been over the Mont Genèvre, while in June, 1883, I was the companion of Mr. Freshfield on his passage of the Argentière. All I can say is that I never saw "rich plains at the foot of the Argentière" till the Stura issued from its narrow valley into the Piedmontese plain at Borgo San Dalmazzo, which is 8 miles from Cuneo, but 33 *miles* from Argentera, the village immediately at the foot of the pass. Perhaps I may be allowed to refer Mr. Westlake to my

descriptions of the routes over the two passes in the new edition (1898) of vol. i. of Mr. Ball's 'Alpine Guide.'

I have a fair working knowledge of the literature relating to Hannibal's pass, and have long ago come to the conclusion that the original extant accounts are quite contradictory, and that they cannot be reconciled. I have had, too, the advantage (probably never enjoyed by any other person) of having myself traversed every pass (with one or two exceptions), great or small, that has ever been claimed for Hannibal even by the wildest theorist, while in the case of these rare exceptions I have been on the summit of the pass, actually traversing but one side up and down, yet having had a close view of the other side. And I have no hesitation in stating that I am entirely and wholly in favour of the Mont Genèvre as most probably Hannibal's pass, the old mule-path from Clavières to Césanne (see Ball, vol. i. p. 80) being of course preferred to the circuitous modern carriage road. Most recent writers on the Continent are in favour of the Mont Genèvre, save, of course, Mommsen, who still clings to the impossible Little St. Bernard. The case for the Mont Genèvre has lately been very forcibly stated by Prof. Josef Fuchs in his small tractate entitled 'Hannibal's Alpenübergang' (Vienna, 1897), based on personal investigations on the spot, and with full knowledge of all the literature. As far as I am aware, Mr. Freshfield and Mr. Westlake stand alone in advocating the claims of the Argentière, which I for one consider quite baseless.

W. A. B. Coolidge.

March 7, 1899.

Lowthian Green's Tetrahedral Theory.

In the March number of the *Geographical Journal*, p. 250, I read the following words of Mr. Vaughan Cornish, speaking on the theory of Lowthian Green:—

"It is not the smallest part of our indebtedness to Dr. Gregory that his great power of exposition has brought this theory again before the world."

If Mr. Cornish would have spoken of the "*English* world," I would have nothing to object. But I am entitled to state that as early as 1881, the first edition of my 'Traité de Géologie' contained a detailed account of the Lowthian Green theory, together with a discussion of the Elie de Beaumont pentagonal system. Moreover, the diagrams 4*a* and 5*b* of Mr. Gregory are nearly identical with the drawings in my book.

As the expansion of my 'Traité' has been a very large one (more than 11,000 copies are now circulating through the world, and a fourth edition is in the press), I would claim for myself the merit of having, *eighteen years ago*, "brought before the world" the theory of the distinguished English writer, while Green's countrymen had failed to appreciate the work in due time.

Prof. A. de Lapparent.

Paris, March 3, 1899.

MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY, SESSION 1898-1899.

Sixth Ordinary Meeting, February 27, 1899.—Sir Clements Markham, K.C.B., President, in the Chair.

Elections:—*Sidney J. Braithwaite; Captain Charles Ernest Carr; Colonel Arthur George Hay Church; James Creelman; Henry Nathaniel Gardiner, M.S.A.; Samuel Day Hopkinson; Walter Lindley Jones; Charles Gerald Lee; Heber*

Mardon; Edward Octavius Potter; Charles Schaefer Rutledge; George Todd Symons; Louis Robert Stirke Tomalin; Captain A. E. Watherston, R.E.; John Mason Welsh, Ph.D.; Captain William Graham White, R.N.; Richard T. Williamson, M.D., M.R.C.P.; Ernest Henry Woolrych.

The PRESIDENT said: Before commencing the business of the evening, I have to announce to the Fellows that the Lord Mayor has invited you all to attend a meeting at the Mansion House on Monday, March 6, at 3 p.m., when there is going to be a discussion on the best way of celebrating the thousandth anniversary of the death of Alfred the Great. King Alfred was one of our first geographers, and one of our greatest, and was the first to begin to collect accounts of voyages and travels, and to give to Englishmen an idea of what geography is, and the uses it can be put to. I think this movement for celebrating the greatness of King Alfred should receive the support of all the Fellows of this Society. I must also refer to the great meeting that was held a fortnight ago at Berlin on the subject of a German Antarctic expedition; it was an enthusiastic meeting. The Emperor intended to have been present, but, being unable to come, he sent a letter in which he expressed regret at not being present. It was announced that most liberal and generous support had been given to the German antarctic expedition by wealthy and patriotic men of that country. It was announced, also, that the Government had come forward with a large vote in order to supplement the generosity of private individuals. It was also announced that the Germans hoped and expected that we would join with them and co-operate in the work of exploring the antarctic regions, and they went so far as to sketch out a scheme with that object. I have only to say that there is a great contrast between what patriotic men are doing in that country and what we are doing here, and I trust most sincerely that the contrast will not be allowed to continue.

I have further, with much regret, to allude to the death of Sir George Bowen. I will not refer, it is not my place to refer, to his public services; but we lament the loss of a useful member of our Council, and a most entertaining, genial, and kindly friend. We have also lost within a very few days Sir Lambert Playfair, who has done so much for geography in his 'History of Yemen,' and his valuable and interesting works on the Barbary States, and so much for the Society by his labours on the bibliography of Algeria and the Barbary States.

The Paper read was:—

"Travels and Researches in Rhodesia." By Dr. H. Schlichter.

Seventh Ordinary Meeting, March 13, 1899.—Sir CLEMENTS MARKHAM, K.C.B., President, in the Chair.

ELECTIONS.—*Thomas Augustine Bland; Reginald Thomas Hacker Bodilly, L.R.C.P., M.R.C.S.; Lieut. Richard George Tyndall Bright (Rifle Brigade); Captain George William Freeman; George Herbert Graham; John White Hopkins, L.R.C.P., M.R.C.S.; G. J. Jacobs, F.R.A.S.; Sydney Edward Hamilton Lane; T. Lambert Mears; Lieut. Hugh I. Nicholl (Bedfordshire Regiment); Rev. William Albert Noyle; Frank Baldwyn Parkinson; Alfred Leonard Poile; Lieut. Francis Garden Poole (1st East Yorkshire Regiment); Frank Smitherman; Samuel Clement Southam, F.S.A.; Charles M. Taylor; George Weller, M.R.C.S.*

The Paper read was:—

"The Uses of Practical Geography, as illustrated in Recent Frontier Operations." By Colonel Sir T. H. Holdich, K.C.I.E., C.B., R.E.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By HUGH ROBERT MILL, D.Sc., *Librarian*, R.G.S.

THE following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A = Academy, Academie, Akademie.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Com. = Commerce, Commercial.
C. Rd. = Comptes Rendus.
Erdk. = Erdkunde.
G. = Geography, Geographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
Iz. = Izvestiya.
J. = Journal.
M. = Mitteilungen.
Mag. = Magazine.
P. = Proceedings.
R. = Royal.
Rev. = Review, Revue, Revista.
S. = Society, Société, Selskab.
Sitzb. = Sitzungsbericht.
T. = Transactions.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.
Zap. = Zapiski.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

A selection of the works in this list will be noticed elsewhere in the "Journal."

EUROPE.

Alps. *C. Rd.* **128** (1899): 57–59. **Kilian and Lugeon.**

Une coupe transversale des Alpes briançonnaises, de la Gyronde à la frontière italienne. Note de MM. Kilian et Lugeon. *With Diagram.*

Austria—Bosnia. *B.S.R. Belge G.* **22** (1898): 467–491. **Hontoir.**

Par les routes nouvelles à l'ouest de la Bosnie. Par E. Hontoir.

Belgium. *Mouvement G.* **15** (1898): 614–615. **Martel.**

Exploration de la grotte de Han. Par E. A. Martel.

Denmark—Surveys. **Zachariae.**

Oversigt K. Danske Vidensk. S. Forhandl. (1898): 163–207.

Præcisionsnivellementet over Store Belt. Af Generalmajor G. Zachariae. Avec résumé en français.

On the survey operations across the Great Belt.

France—Geology. **Meunier.**

Stanislas Meunier. Nos Terrains. Paris: A. Colin & Cie., 1898. Size 12½ × 9, pp. xx. and 192. *Coloured Plates, etc.*

A popular account of the geology of France, with elementary instructions in practical geology, and many interesting coloured views of scenery.

France—Mont Blanc. *Atti R.A. Lincei, Rendiconti* **8** (1899): 34–38, 65–68. **Pizzetti.**

La gravità sul Monte Bianco. Nota di P. Pizzetti.

France—Morvan. *Ann. G.* **7** (1898): 404–428; **8** (1899): 6–21. **Michael-Lévy.**

Le Morvan et ses attaches avec le Massif Central. Par M. A. Michael-Lévy. *With Map and Sections.*

An analytic study of the physical geography of the highlands of Morvan, showing the relation of geological structure to geographical form.

France—Soil. *C. Rd.* **127** (1898): 1041–1043. **Meunier.**

Sur le rôle de la sédimentation souterraine dans la constitution du sol d'une partie du département de l'Orne. Note de M. Stanislas Meunier.

Germany. *G.Z.* **4** (1898): 601–617, 665–694. **Kurs.**

Die Künstlichen Wasserstrassen im Deutschen Reiche. Von Victor Kurs.

Germany—Alsace. *Deutsche G. Blätter* **21** (1898): 119–151. **Pilz.**

Die Wälder des Elsass in forstwirtschaftlichen. Beleuchtung. Von kaiserl. Oberforstmeister Pilz. *With Map.*

Germany—Thuringia. *M.G. Ges. Jena* **17** (1898): 71–94. **Gerbing.**

Die Strassenzüge von Südwest-Thüringen. Von Luise Gerbing. *With Map.*

An account of the old roads of Thuringia between Mühlhausen in the north, Mihla and Eisenach in the west, and Erfurt and Arnstadt in the east. The map on the scale of 1 : 130,000 distinguishes between ancient and modern roads.

Hungary. *M.G. Ges. Wien* **41** (1898): 535–592. ———

Die landwirtschaftliche Production der Länder der ungarischen Krone in den Jahren 1895 und 1896.

Italy. *Riv. G. Italiana* **5** (1898): 481–485. **Mori.**

Formazione di un nuovo laghetto presso la Falterona. Notizia di Attilio Mori.

On the formation of a new lakelet near Falterona.

Italy—Vesuvius. **Lapparent.**

Annuaire Club Alpin Français **24** (1897) (1898): 509–523.

Le Vésuve et la Somma. Par M. A. de Lapparent. *With Map.*

Also separate copy. *Presented by the Author.*

Mediterranean—Crete. ———

Turkey. Nos. 5, 6, and 7 (1898). Further Correspondence respecting the Affairs of Crete. [3 Reports.] London: Eyre & Spottiswoode, 1898. Size 13½ × 8½, pp. (No. 5) xii. and 206; (No. 6) vi. and 82; (No. 7) xii. and 142. *Price* (No. 5) 1*s.* 9*d.*; (No. 6) 9*d.*; (No. 7) 1*s.* 3*d.*

Norway. *Annuaire Club Alpin Français* **24**, 1897 (1898): 412–471. **Ronjat.**

Promenades en Norvège. Par M. Jules Ronjat. *With Illustrations.*

Norway—Meteorology. **Mohn.**

Jahrbuch des Norwegischen Meteorologischen Instituts für 1896 (pp. xii. and 120); 1897 (pp. xii. and 120). Christiania, 1897–98. Size 13½ × 10½. *Presented by the Norwegian Meteorological Institute.*

Rumania. **Gubernatis.**

Comte Angelo de Gubernatis. La Roumanie et les Roumains. Impressions de Voyage et Études. Florence: B. Seeber, 1898. Size 9½ × 6½, pp. 308. *Illustrations. Price* 5*fr.*

Russia. *J.R. United Service I.* **42** (1898): 1414–1423. **Beresford.**

The State Defences of Russia. Compiled by Lieut.-Colonel C. E. de la Poer Beresford.

Scandinavia. *Annuaire Club Alpin Français* **24**, 1897 (1898): 524–589. **Vélain.**

Les pays Scandinaves et Finlandais. Par M. Ch. Vélain. *With Illustrations.*

Spain. *B.S.G. Madrid* **40** (1898): 122–129. **Blázquez.**

Vias romanas españolas. Por D. Antonio Blázquez.

On the Roman roads in Spain.

Spain—Pyrenees. *Annuaire Club Alpin Français* **24** (1897) (1898): 332–359. **Brousse.**

L'Enclave espagnole de Llivia. Par M. E. Brousse Fils. *With Map and Illustrations.*

On a little patch of Spanish territory in the French department of Pyrenées Orientales.

Sweden. *Ymer* **18** (1898): 221–232. **Nerman.**

Om Vätterns hydrografi. Af Gustaf Nerman.

On the hydrographic conditions of Lake Vetter.

United Kingdom—London. *J.S. Arts* **47** (1898): 7–21. **Barry.**

Opening Address. By Sir John Wolfe Barry, K.C.B., F.R.S. *With Plan.*

The address deals with the problem of accommodating the increasing traffic of the streets of London, and the plan suggested is the construction of new thoroughfares connecting the great traffic centres.

ASIA.

Asia. **Das.**

A Note on the Ancient Geography of Asia, compiled from Valmiki-Ramayana. By Nobin Chandra Das, M.A. Published by the Buddhist Text Society of India. 1896. Size 10 × 6½, pp. viii. and 78. *Map. Presented by the Author.*

A study of the early geography of India from the Himalaya to Ceylon, derived from the journeys of Rama recorded in the famous Sanskrit poem Valmiki-Ramayana.

Asiatic Travel. **Reid.**

From Peking to Petersburg. By Arnot Reid. London: Edward Arnold, 1899. Size 8½ × 5½, pp. vi. and 300. *Map and Portrait. Price 7s. 6d. Presented by the Publisher.*

Mr. Reid travelled in 1898 from Peking, through Mongolia, to Siberia, reaching the temporary terminus of the Trans-Siberian railway at Irkutsk, and proceeding thence by rail. The whole journey occupied fifty days, and was effected with comfort and without any dangerous adventures. Part of the book has already appeared in the form of articles in the *Times* and other newspapers.

Ceylon. **Leclercq.**

Un missionnaire belge dans l'île de Ceylan. Par Jules Leclercq. Extrait de la *Revue Générale*, février, 1899. Bruxelles: Société Belge de Librarie, 1899. Size 10 × 6½, pp. 16. *Presented by the Author.*

China. *Petermanns M.* **45** (1899): 8–13. **Cholnoky.**

Vorläufiger Bericht über meine Forschungsreise in China. Von Eugen v. Cholnoky.

This is referred to in a note on p. 430.

China. *Ann. G.* **8** (1899): 62–73. **Raveneau.**

La Chine économique, d'après les travaux de la mission lyonnaise, 1895–1897. Par M. L. Raveneau. *With Map. Also a separate copy presented by the Author.*

A summary of the great Report of the commercial mission of the Lyons Chamber of Commerce.

China. *Globus* **74** (1898): 349–350. **Schlüter.**

Die Reformbestrebungen in China und die Reaktion. Von Dr. O. Schlüter.

China. *Verh. Ges. Erdk. Berlin* **25** (1898): 410–430. **Schumacher.**

Herr Dr. Hermann Schumacher: Der Westfluss (Hsikiang) und seine wirtschaftliche Bedeutung.

China. *J.S. Arts* **47** (1898): 77–84. **Little.**

The Yangtse Basin and the British Sphere. By Archibald Little.

China—Peking. **Favier.**

Péking, histoire et description. Par Alph. Favier. Péking: Imp. des Lazaristes au Pé-t'ang, 1897. Size 13½ × 10½, pp. xii. and 562. *Illustrations. Price* £2 18*s.* 6*d.*

Finely illustrated with over 800 engravings, most of them reproductions of the work of Chinese artists.

China—Shantung. *Verh. Ges. Erdk. Berlin* **25** (1898): 379–410. **Gaedertz.**

Herr Ober-Ingenieur Gaedertz: Reisen in Schantung. *With Map.*

China—Yangtse Valley. **Foster.**

In the Valley of the Yangtse. By Mrs. Arnold Foster. London: London Missionary Society, 1899. Size 8½ × 7, pp. xii. and 216. *Illustrations. Presented by the Publishers.*

A book by a lady missionary, intended mainly for children.

China and Japan. *B.S.R.G. d'Anvers* **22** (1898): 143–155. **Reclus.**

L'Extrême-Olient. Par M. Elisée Reclus. *With Map.*

On the political geography of the Far East and its possible changes.

Chinese Empire—Tibet. *J. Asiatic S. Bengal* **67** (Pt. i.) (1898): 256–273. **Das.**

An account of Travels on the Shores of Lake Yamdo-Croft. By Sarat Chandra Das.

After recalling earlier visits to Lake Palti, and giving a short general account of Tibet, the author describes his journey to Samding, the great Buddhist monastery on the shore of Lake Yamdo in 1882.

Chinese Turkestan. *C. Rd.* **128** (1899): 154–156. **Tillo.**

Résultats des observations météorologiques faites dans la dépression au centre du continent asiatique (station Luktshoun).

Observations at Lukchun, in the middle of the Turfan depression, which are summarized on p. 431.

French Indo-China—Laos. **Bobo.**

Rev. Française **23** (1898): 505–516, 571–582, 725–733.

Les habitants du Laos. Par le Capitaine Bobo.

This paper deals with the mode of life of the people, their industries, and the resources of their country.

Hong Kong. ———

Treaty Series. No. 16, 1898. Convention between the United Kingdom and China, respecting an extension of Hong Kong Territory. Signed at Peking, June 9, 1898. London: Eyre & Spottiswoode, 1898. Size 10 × 6½, pp. 2. *Map. Price* 3½*d.*

India. **Gehring.**

Süd-Indien. Land und Völk der Tamulen. Von Hans Gehring. Gütersloh: C. Bertelsmann, 1899. Size 10½ × 7, pp. viii. and 246. *Map and Illustrations. Price* 5*s.*

India—People. *Ymer* **18** (1898): 203–219. **Johansson.**

Det moderna kastväsendet i Indien. Af K. F. Johansson.

On the caste system in modern India.

India—Tide-Tables. **Burrard and Roberts.**

Tide-Tables for the Indian Ports for the year 1899 (also January, 1900). Part i. —Western Ports (Suez to Pámban Pass). Part ii.—Eastern and Burma Ports (Galle to Port Blair). By Major S. G. Burrard and E. Roberts. Size 6½ × 4½, pp. 1172.

Indian Ocean—Seychelles. **Stewart.**

Seychelles. Annual Report for 1897.—Colonial Reports, Annual No. 252, 1898. Size 10 × 6½, pp. 12. *Price* 1*d.*

Indo-China—History. *Rev. G.* **43** (1898): 412–426. **Faure.**

Les origines de l'Empire français dans l'Indo-Chine. Par M. A. Faure.

This is the concluding part of a memoir commenced in 1888, describing the work of Poivre in the exploration of Indo-China for the French East India Company in the first half of the eighteenth century.

Kiauchou. *Kolonial Jahrb.* **11** (1898): 33–90, 148–155. ———

Kiautschou.

A history of the acquisition of Kiauchou, and an estimate of its value to Germany.

Malay Archipelago—Celebes. **Kruijt.**

M.G. Ges. Jena **16** (1898): 1–48; **17** (1898): 24–66.

Beiträge zur Volkskunde der Poso-Alfuren. Von Missionar A. C. Kruijt.

A description of the Poso-Alfurian people, their industries, games, beliefs, and customs.

Malay Archipelago—Java. **Gallois.**

Annuaire Club Alpin Français **24**, 1897 (1898): 472–506.

Les Volcans de Java. Par M. Eugène Gallois. *With Maps and Illustration.*

Malay Archipelago—Philippines. *M.G. Ges. Wien* **41** (1898): 593–606. **Blumentritt.**

Der Batan-Archipel und die Babuyanen-Inseln. Von Ferdinand Blumentritt.

Malay Archipelago—Sumatra. *National G. Mag.* **9** (1898): 449–464. **Fairchild.**

Sumatra's West Coast. By David G. Fairchild. *With Illustrations.*

Russia—Caucasus. *Petermanns M.* **44** (1898): 251–258, 271–275. **Busch.**

Vorläufiger Bericht über eine Reise in den nordwestlichen Kaukasus im Jahre 1896 zur Untersuchung der Gletscher und der Vegetation. Von N. A. Busch.

Russia—Caucasus. *Annuaire Club Alpin Français* **24**, 1897 (1898): 690–697. **Regaud.**

Au col Dongouz-Oroum (épisode d'un voyage dans le Caucase). Par M. Claudius Regaud.

Russian Central Asia. *Norske G. Selsk. Aarb.* **9** (1898): 56–152. **Wille.**

Fra St. Petersburg til Turkestan af professor dr. N. Wille.

A journey to Askhabad.

AFRICA.

Abyssinia. **Orleans.**

Prince Henri d'Orléans. Une Visite à l'Empereur Ménélick. Notes et Impressions de route. Paris: Libraire Dentu. [*Not dated.*] Size 8 × 5½, pp. 264. *Illustrations. Price* 10 *fr.*

Abyssinia—Historical. **D'Abbadie and Paulitschke.**

Futûh el-Hábacha. Des conquêtes faites en Abyssinie au XVI^e^ siècle par l'Imam Muhammad Ahmad dit Gragne. Version Française de la Chronique Arabe du

Chahâb ad-Dîn Ahmad. Publication commencée par Antoine D'Abbadie, terminée par le Dr. Philippe Paulitschke. Paris: E. Bouillon, 1898. Size 9 × 6, pp. xxviii. and 394. *Price* 20 *fr.*

Africa—Colonization. **Johnston.**

A History of the Colonization of Africa by Alien Races. By Sir Harry H. Johnston, K.C.B. Cambridge: the University Press, 1899. Size 8 × 5½, pp. xii. and 320. *Maps. Price* 6*s. Presented by the Cambridge University Press.*

African Anthropology. *J. Anthrop. I.* **1** (1898): 55-94. **Shrubsall.**

A Study of A-Bantu Skulls and Crania. By F. Shrubsall, B.A. *With Plate.*

African Railways. *Contemporary Rev.* **75** (1899): 161–168. **Wills.**

"The Cape to Cairo." The Buluwayo-Tanganyika and other Railways. By J. T. Wills. *With Map.*

African Treaties. **Ortroy.**

Conventions internationales définissant les Limites actuelles des Possessions, Protectorats et Sphères d'influence en Afrique, publiées d'après les textes authentiques par le Capitaine Commandant F. Van Ortroy. Bruxelles, Soc. Belge de Librairie. Paris: F. Alcan, 1898. Size 10 × 7, pp. xx. and 518. *Map. Presented by the Publishers.*

This is a valuable collection of African boundary treaties and conventions given in the original languages, and rendered available for references by a series of very convenient indexes. These include a full chronological index extending from 1841 to 1896, a summary of documents arranged under the head of the countries concerned in alphabetical order, an index of the ministers, ambassadors, or agents signing the various documents, and a very detailed subject index mentioning all the place-names referred to.

Barongo Songs. **Junod.**

Les Chants et les Contes des Ba-Ronga de la Baie de Delagoa, recueillis et transcrits. Par Henri A. Junod. Lausanne: G. Bridel & Cie., 1897. Size 7½ × 5, pp. 328. *Illustrations. Price* 4 *fr. Presented by Poultney Bigelow, Esq.*

An interesting collection of the songs and folk-tales of the natives of the Delagoa bay district.

British Colonization. *Deutsche Rundschau G.* **21** (1899): 155–160. **Rumpe.**

Die Entwickelung des englischen Colonial-Besitzes in Afrika. Von Dr. Robert Rumpe. *With Map.*

British East Africa—Uganda. *B.S.G. Lyon* **15** (1899): 333–338. **Streicher.**

L'Ouganda. Par Mgr. Streicher.

Egyptian Sudan. *Rev. G.* **43** (1898): 401–411. **Rouire.**

Omdurman et Fachoda, le Soudan égyptien, rivalité de la France et de l'Angleterre sur le haut Nil. Par le Dr. Rouire.

French Congo. *Rev. Française* **23** (1898): 653–660. **Montell.**

La marche de la mission Marchand. Par A. Montell.

Describes, with dates, the march of Major Marchand across the Sudan.

French Sudan. *Rev. Française* **23** (1898): 689–704. **Montell.**

Au lac Tchad: Mission Gentil. Par A. Montell. *With Map and Portrait.*

South African Republic. **Evans.**

Report on the Trade, Commerce, and Gold-Mining Industry of the South African Republic for the Year 1897. London: Eyre & Spottiswoode, 1898. Size 10 × 6½, pp. 62. *Price* 3*d.*

Transvaal. *Norske G. Selsk. Aarb.* **9** (1898): 1–11. **Dahl.**

Erindringer fra et 2-aarigt ophold i Sydafrika af premierløitnant Johannes Dahl.

Observations during a two-years' stay in the Transvaal.

West Africa. *Petermanns M.* **44** (1898): 193–204, 265–271. **Frobenius.**

Der westafrikanische Kulturkreis. Von Leo Frobenius. *With Maps.*

West Africa—Niger boundaries. *Rev. Française* **23** (1898): 672–676. ———

Convention Franco-Anglaise du Niger. *With Map.*

West Africa—Niger countries. **Hourst.**

French Enterprise in Africa. The Personal Narrative of Lieut. Hourst of his Exploration of the Niger. Translated by Mrs. Arthur Bell (N. D'Anvers).

London: Chapman & Hall, 1898. Size 9 × 6, pp. xvi. and 520. *Map, Portrait, and Illustrations. Price* 24*s.*

The original French edition of this work was noticed in the *Journal*, vol. xii. p. 305.

NORTH AMERICA.

America—Aborigines. **Payne.**

History of the New World called America. By Edward John Payne. Vol. ii. Oxford: the Clarendon Press, 1899. Size 9 × 6, pp. xxviii. and 548. *Price* 14*s. Presented by the Clarendon Press.*

This volume continues the scholarly study of the American aborigines commenced in the previous part of the work, discussing the degree of civilization attained, the character of the languages, the spread of the primitive people over America, and the history of the Mexican and Inca empires.

American Geology—Bibliography. **Weeks.**

Bibliography and Index of North American Geology, Paleontology, Petrology, and Mineralogy for the year 1896. By F. B. Weeks.—Bulletin of the United States Geological Survey, No. 149. Washington: 1897. Size 9½ × 6, pp. 152. *Presented by the U.S. Geological Survey.*

American Languages. **Brinton.**

A Record of Study in Aboriginal American Languages. By Daniel G. Brinton, M.D., etc., Media, Pa. Printed for private distribution, 1898. Size 10 × 6½, pp. 24. *Presented by the Author.*

Canada. **Penck.**

Reisebeobachtungen aus Canada. Vortrag gehalten den 16. März 1898. Von Albrecht Penck.—Vorträge des Vereines zur Verbreitung naturwissenschaftlicher Kenntnisse Wien. XXXVIII. Jahrgang, Heft 11. Wien, 1898. Size 7½ × 5, pp. 54. *Illustrations. Presented by the Author.*

An account of the geological excursion across Canada on the occasion of the Toronto meeting of the British Association.

Canada—Anticosti. *A travers le Monde. Tour du Monde* **4** (1898): 397–398. ———

Anticosti. *With Map.*

Canada—British Columbia. *Globus* **74** (1898): 358–362. **Dorsey.**

Bootfahrten zwischen Haida- und Tlingit-Dörfern, in der Nähe von Dixons Entrance. Von George A. Dorsey. *With Illustrations.*

Canada—British Columbia. *B.S.G. Italiana* **12** (1899): 26–32. **Simone.**

Attraverso alla Colombia Inglese. Relazione preliminare di viaggio del dott. D. R. de Simone. *With Map.*

Notes of a journey from Ashcroft up the valleys of the Frazer, North Tatlan, and Finlay rivers, and thence by the Dease river and across the Cassiar mountains to Lake Teslin, returning down the Stikine river to Fort Wrangell.

Canada—Mackenzie. *B.S.G. Paris* **19** (1898): 291–307. **Sainville.**

Voyage à l'embouchure de la rivière Mackenzie (1889–1894). Par Édouard de Sainville. *With Map.*

Canada—Montreal. ———

Montreal and the St. Lawrence Route.—The *Herald*, Montreal, November 26, 1898. Size 23 × 17½, pp. 24. *Illustrations.*

A special number of a Montreal newspaper setting forth the commercial advantages of that city and of the St. Lawrence route.

Canada—Tides. ———

Tide Tables for Halifax, Quebec, and St. John, N.B., for the year 1899; with Tidal Differences for the Atlantic Coast of Nova Scotia, and for the St. Lawrence River, from Three Rivers to Gaspé. Reprinted from Greenwood's Nautical Almanac and Tide Tables for 1899. Size 8½ × 7, pp. (8).

Canada—Yukon Territory. **Auzias-Turenne.**

Raymond Auzias-Turenne. Voyage au Pays des Mines d'Or—le Klondike. Paris: C. Lévy, 1899. Size 7½ × 5, pp. 318. *Maps and Illustrations. Price* 4 *fr.*

A graphic account of a journey to Klondyke in 1898.

Mexico. **Dominguez.**

Disertación hidrográfica. Por el Sr. Angel M. Dominguez.—Numero Especial del Boletin de la Sociedad de Geografia y Estatadística de la República Mexicana. Pp. 53–61. Mexico, 1898.

Mexico. *B.S.G. y Estad. Rep. Mexicana* **4** (1898): 50–72. **Howarth and Turnbull.**

El Popocatepetl y los Volcanes de Mexico. Estudio presentado á la Real Sociedad de Geografia de Londres en su sesión de 13 de Avril de 1896. Por Mr. O. H. Howarth, traducido y anotado por el socio Ingeniero Enrique A. Turnbull. *With Illustrations.*

Mexico—Oaxaca. *B.S.G. y Estad. Rep. Mexicana* **4** (1898): 93–130. **Noriega.**

La Geografia del Estado de Oaxaca. Por el Sr. Eduardo Noriega. *With Maps.*

Describes the physical geography of the state of Oaxaca, and the political subdivisions in some detail.

Mexico—Palenque. *Globus* **75** (1899): 77–80. **Förstemann.**

Aus dem Inschriftentempel von Palenque. Von E. Förstemann. *With Illustrations.*

On the decipherment of some of the old Mexican inscriptions.

Mexico—Palenque. **Maudslay.**

Biologia Centrali-Americana; or Contributions to the Knowledge of the Fauna and Flora of Mexico and Central-America. Edited by F. Ducane Godman. Archæology. By A. P. Maudslay. [Part x., January, 1899.] (Vol. iv. pp. 31–38.) London: R. H. Porter, and Dulau & Co. Size 13 × 10½. *Plates*, lxxiv. xciii. *separate.*

CENTRAL AND SOUTH AMERICA.

Argentine Republic. **Märtens.**

Süd-Amerika unter besonderer Berücksichtigung Argentiniens. Nach den neuesten amtlichen Quellen und auf Grund eigener Anschauung. Von Dr. P. Märtens. Berlin: J. Räde, 1899. Size 8 × 6, pp. viii. and 284. *Map and Illustrations. Price* 4*s.*

Brazil. ———

Commissão Geographica e Geologica de São Paulo. Secção Meteorologica. Dados climatologicos do anno de 1893 (pp. 76); 1894 (pp. 88, *diagrams*); 1895 (pp. 84, *diagrams*); 1896 (pp. 84, *diagrams*); 1897 (pp. 68, *diagrams*). S. Paulo, 1895–96. Size 9 × 6¼.

Brazil. ———

B. Commis. G. e Geolog. São Paulo **12** (1897): 1–496; 13, 1–221; 14, 1–128.

Flora paulista. I. Familia Compositæ. II. Familias Solanaceæ e Scrophulariaceæ. III. Familias Campanulaceæ, Cucurbitaceæ e Calyceraceæ. Serie Aggregatæ, Familia Valerianaceæ.

On the plants of São Paulo.

Brazil. **Coudreau.**

Henri Coudreau. Voyage au Xingú, 30 mai 1896—26 octobre 1896. Paris: A. Lahure, 1897. Size 11½ × 9, pp. 230. *Map and Illustrations.*

The account of the journey is supplemented by extensive vocabularies.

Brazil—Natives. *Globus* **75** (1899): 5–9. **Steinen.**

Indianerskizzen von Hercules Florence. Von Karl von den Steinen. I. *With Illustrations.*

Drawings of the wild Indians of Brazil, drawn by the artist Hercules Florence, who was born in Nice in 1804, emigrated in early life to Brazil, and died there in 1879.

Brazil—São Paulo. *B. Commis. G. e Geolog. São Paulo* **10** (1895): 1–116. **Löfgren.**

Ensaio para uma synonimia dos nomes populares das plantas indigenas do Estado de S. Paulo. Por Alberto Löfgren.

Chile. ———

Anuario hidrográfico de la Marina de Chile. Año 21. Santiago de Chile, 1898. Size 10 × 7, pp. xxx. and 560. *Charts and Diagrams.*

Dutch Guiana. **Benjamins.**

Tijds. K. Ned. Aard. Genoots. Amsterdam **15** (1898): 797–846.

De Grenzen van Nederlansch Guiana. Door Dr. H. D. Benjamins. *With Maps.*

A discussion of the boundaries of Dutch Guiana, taking account of the very curious character of the Dutch jurisdiction over the river Corentyne, which forms the boundary with British Guiana.

Ecuador—Galapagos Islands. **Ridgway.**

Birds of the Galapagos Archipelago. By Robert Ridgway.—Proceedings of the United States National Museum. Vol. xix. Washington, 1897. Size 9½ × 6, pp. 459–670. *Charts and Plates.*

An account of the avifauna of the Galapagos islands, taking account of all that is known on the subject, with references to previous writers.

French Guiana. **Hess.**

Jean Hess. A l'Ile du Diable. Enquête d'un reporter aux Iles du Salut et à Cayenne. Paris: Nilsson [not dated]. Size 7½ × 5, pp. 232. *Illustrations. Price 2s. 8d.*

Haiti. *Atti R. A. Lincei, Rendiconti* **7** (2 Sem.) (1898): 316-318. **Agamennone.**

Il terremoto nell' isola di Haïta (Antille) del 29 dicembre 1897. Nota del dott. G. Agamennone.

Honduras. *B.S.R.G. d'Anvers* **22** (1899): 181-219. **Jalhay.**

La République de Honduras. Par M. H. Jalhay.

An account of the geography, resources, and present condition of Honduras, by the Consul for that republic at Brussels.

South America. **Cisneros and Garcia.**

Geografia comercial de la América del Sur. Por Carlos B. Cisneros y Romulo E. Garcia. Parte Preliminar. Lima, 1897. Size 9½ × 6½, pp. x. and 6. *Presented by the Geographical Society of Lima.*

South American Indians. **Nery.**

Les Indiens et le peuplement de l'Amérique chaude. Par le Baron F. De Santa-Anna Nery.—Journal de la Société des Américanistes de Paris. Paris, 1898. Size 11½ × 9, pp. 20. *Presented by the Author.*

Baron de Santa Anna Nery points out that the interest of geographers and students has in recent years been largely diverted from South America to Africa. He treats of the native "Indians," and cites a number of instances of their natural qualities winning for them high reputation in competition with Europeans.

AUSTRALASIA AND PACIFIC ISLANDS.

British New Guinea. **Macgregor.**

Despatch from His Excellency the Lieutenant-Governor of British New Guinea, reporting visit inland to the Western end of the Owen Stanley Range, and thence across the Island to the North-East Coast. [No. 5.] 1898. Size 13½ × 8½. *Presented by the Colonial Office.*

Ellice Islands. *Natural Science* **14** (1899): 17-37. **Sollas.**

Funafuti: the Study of a Coral Atoll. By Prof. W. J. Sollas, M.A., etc. *With Illustrations.*

The Friday evening lecture given at the Bristol meeting of the British Association.

Fiji.

Fiji. Annual Report for 1897.—Colonial Reports, Annual No. 244, 1898. Size 10 × 6½, pp. 14. *Price 1d.*

Murray Islands. *J. Anthrop. I.* **1** (1898): 5-19. **Hunt.**

Ethnographical Notes on the Murray Islands. Torres Straits. By Rev. Archibald E. Hunt.

New Guinea. *Tijds. Indische Taal-, Land- en Volkenk.* **40** (1898): 287-316. **Serrurier.**

Die Korwâre oder Ahnenbilder Neu-Guinea's; ein Beitrag zur Geschichte der bildenden Kunst. Von Dr. L. Serrurier. *With Map and Plates.*

On the carved wooden ancestral images of the tribes of Dutch New Guinea, classified according to regions.

New Zealand—Year-Book. **Dadelszen.**

The New Zealand Official Year-Book, 1898. By E. J. von Dadelszen. Wellington, 1898. Size 8½ × 5½, pp. vi. and 684. *Illustrations.*

Pitcairn Island. *Globus* **75** (1899): 74-77. **Carlsen.**

Ein Bericht aus Pitcairn Island. Von Dr. F. Carlsen. *With Illustrations.*

Notes on Pitcairn island, from the narrative of one of the officers of H.M.S. *Royalist*, which visited the island in 1897.

Western Australia. **Smith.**

Western Australia. Geological Survey, Bulletin No. 2. 1. The State of Mining in the Kimberley District. 2. The Probability of obtaining Artesian Water between the Pilbarra Goldfields and the Great Desert. By R. Neil Smith, Perth, 1898. Size 8½ × 6, pp. 28. *Maps, Plans, and Sections. Presented by the Government Geologist, Western Australia.*

POLAR REGIONS.

Antarctic. *Ymer* **18** (1898): 275–320. **Ohlin.**

Om antarktiska färder och Antarktis. Af Axel Ohlin. *With Maps.*

A general account of antarctic exploration.

Antarctic. *J. School G.* **2** (1898): 369–379. **Taylor.**

Our Knowledge of the Antarctic. By W. A. Taylor.

Arctic—Spitsbergen Seas. *Ymer* **18** (1898): 321–348. **Nathorst.**

Om 1898 års svenska polarexpedition. Af A. G. Nathorst. *With Map and Illustrations.*

An account of Prof. Nathorst's cruise in 1898.

Spitsbergen Seas. *Verh. Ges. Erdk. Berlin* **25** (1898): 430–448. **Rüdiger.**

Herr Korvetten-Kapitän Rüdiger: Allgemeines über den Verlauf der Expedition nach dem europäischen Nord-Meer an Bord des Dampfers "Helgoland." *With Map.*

MATHEMATICAL GEOGRAPHY.

Cartography. **Gannett.**

Maryland Geological Survey. The Aims and Methods of Cartography, with especial reference to the Topographic Maps now under construction in Maryland by the United States Geological Survey, in co-operation with the Maryland Geological Survey. By Henry Gannett. (Special Publication, vol. ii. part iii.*a*.) Baltimore: the Johns Hopkins Press, 1898. Size 11 × 7½, pp. 245–335. *Maps and Illustrations.*

This work treats of the whole question of the construction of topographical maps, especially with the operations of surveying.

Cartography. **Zondervan.**

Proeve eener Algemeene Kartografie. Door H. Zondervan. Leiden: J. M. N. Kapteijn, 1898. Size 9½ × 6½, pp. xii. and 162. *Presented by the Author.*

A treatise on Cartography, with chapters on the history of map-making, on surveying, projections, representation of features, the reproduction of maps, map-measurements and criticisms, and a final chapter on school-maps.

Map-projections. **Euler.**

Drei Abhandlungen über Kartenprojection. Von Leonhard Euler. (1777.) Herausgegeben von A. Wangerin. (Ostwald's Klassiker der Exakten Wissenschaften, Nr. 93.) Leipzig: W. Engelmann, 1898. Size 8 × 5, pp. 78. *Price* 1*s.* 2*d.*

Reprint of two papers by Euler—one on the theory of the representation of a spherical surface on a plane, and the other on the geographical projection of the Earth's surface.

Position in Arctic. *Nautical Mag.* **67** (1898): 887–888. **Reeves.**

Dr. Nansen and his Lunar Tables. By E. A. Reeves.

Surveying—History. **Laussedat.**

Recherches sur les Instruments, les Méthodes et le Dessin topographiques. Par le Colonel A. Laussedat. Tome i. Aperçu historique sur les Instruments et les Méthodes. La Topographie dans tous les temps. Paris: Gauthier-Villars, 1898. Size 10 × 6¼, pp. xii. and 450. *Maps, Plates, etc. Price* 12*s.*

This important work is interesting, not only from the historical sketch it gives of the origin of the methods of compiling plans from pictures, but from the fact that it owes its origin to the International Geographical Congress held in London in 1895. Colonel Laussedat, taking up the question of photographic surveying, which was one of the subjects suggested for treatment in the programme, was led to inquire into the history of picture plans, and ultimately to write the book of which the present volume is the first half.

Tides. *Science* **8** (1898): 810–814. **Hayford.**

The Limitations of the Present Solution of the Tidal Problem. By John F. Hayford.

A criticism of the accepted tidal theory.

Time and Longitude. *Rev. Scientifique* **10** (1898): 783–786. **Cugnin.**

Une question à résoudre en 1900: l'heure et la longitude universelles. Par M. E. Cugnin.

PHYSICAL AND BIOLOGICAL GEOGRAPHY.

Atmospheric Physics. *Meteorolog. Z.* **15** (1898): 441–448. **Bezold.**

Ueber die Temperaturänderungen auf- und absteigender Luftströme. Von Wilhelm von Bezold.

Glaciers. *Petermanns M.* **45** (1899): 14–16. **Richter.**

Die Arbeiten der internationalen Gletscher-Kommission. Von Prof. Dr. E. Richter.

Land-forms. *Ann. G.* **8** (1899): 1–5. **Davis.**

Un exemple de plaine côtière. La plaine du Maine (Etats-Unis). Par W. M. Davis. *With Illustration.*

On the coastal plain of Maine as a typical example of coastal plains.

Land-slips. *Globus* **75** (1899): 24–28. **Greim.**

Ueber Bergstürze. Nach einem Vortrage von Dr. Greim. *With Profiles.*

Loess. *American J. Sci.* **7** (1899): 58–60. **Sardeson.**

What is the Loess? By F. W. Sardeson.

Arguments in favour of the purely æolian origin of the North American loess.

Meteorology. *Ann. G.* **8** (1899): 84–87. **Martonne.**

Sur un nouveau mode de représentation du régime des pluies dans les contrées intertropicales. Par M. E. de Martonne.

An ingenious diagrammatic form of showing the periods of rain and dry weather in tropical countries.

Meteorology—Pressure. *Meteorolog. Z.* **15** (1898): 361–387. **Hann.**

Weitere Beiträge zu den Grundlagen für eine Theorie der täglichen Oscillation des Barometers. Von J. Hann.

Also *reprint. Presented by the Author.*

Meteorology—Temperature. *Petermanns M.* **45** (1899): 19. **Supan.**

Vertikale Temperatur abnahme in der freien Atmosphäre. Von Prof. Dr. A. Supan.

Meteorology—Wind. **Dex.**

Rev. Maritime **132** (1897): 286, 479; **133** (1897): 18, 252, 533; **134** (1897): 101, 336. Fleuves aériens, leur cours, leur utilisation par les aérostats. Par M. Léo Dex. *With Maps, etc.*

Oceanic Life. **Herdman.**

The Twelfth Annual Report of the Liverpool Marine Biology Committee, and their Biological Station at Port Erin (Isle of Man). By W. A. Herdman, D.SC., F.R.S. Liverpool, 1898. Size 8½ × 6, pp. 56. *Illustrations. Presented by Professor W. A. Herdman.*

Oceanic Life. *K. Danske Vidensk. Selsk. Skrifter* **4** (1898): 410–454. **Steenstrup.**

Spolia atlantica. Kolossale Blæksprutter fra det nordlige Atlanterhav. Af Prof. Joh. Japetus Sm. Steenstrup. *With Plates.*

Describes and figures portions of a gigantic cuttlefish found in the Atlantic.

Physical Geography. **Davis and Snyder.**

Physical Geography. By William Morris Davis, assisted by William Henry Snyder. Boston, U.S.A., and London: Ginn & Co., 1898. Size 8 × 5½, pp. xviii. and 428. *Maps and Illustrations. Price* 4*s.* 6*d.*

ANTHROPOGEOGRAPHY AND HISTORICAL GEOGRAPHY.

Anthropology. **Forlong.**

Short Studies in the Science of Comparative Religions, embracing all the Religions of Asia. By Major-General J. G. R. Forlong. London: B. Quaritch, 1897. Size 10½ × 7, pp. xxviii. and 662. *Maps and Illustrations. Presented by the Author.*

A mass of curious learning devoted to the elucidation of the common origin of all religions in primitive nature-worship.

Anthropology. *Petermanns M.* **45** (1899): 16–19. **Schurtz.**

Der Ursprung der Kultur nach L. Frobenius. Von Dr. H. Shurtz.

Commercial Geography. *Fortnightly Rev.* **65** (1899): 274–299. **Adams and Taylor.**

The Commercial Future. (1) International Struggle for Life; (2) The Commercial Sovereignty of the Seas. By Benjamin Taylor.

Commercial Geography. **Engelbrecht.**

Die Landbauzonen der aussertropischen Länder. Auf Grund der statistischen Quellenwerke dargestellt. Von Th. H. Engelbrecht. 3 vols. (Vol. iii., Atlas.) Berlin: D. Reimer (Ernst Vohsen), 1899. Size 11½ × 8, pp. (vol. i.) xii. and 280; (vol. ii.) x. and 384. *Presented by the Publisher.*

This very important work discusses the farm-crops and live-stock of all temperate countries, and includes an atlas of over eighty plates showing graphically the relative proportions of all other crops to grain, and of all other live-stock to cattle.

Commercial Geography. **Goulichambaroff.**

Commerce Universel au xix. siècle et le rôle qu'y joue la Russie. Par St. Goulichambaroff. [In Russian.] [With French *résumé*.] St. Petersburg, 1898. Size 11½ × 8, pp. xiv. and 230. *Presented by the Author.*

A short history of commerce is followed by an account of the chief commodities of importance in the nineteenth century, and a consideration of the part played by all commercial nations, especially with regard to their intercourse with Russia.

Historical. *B.S.G. y Estad. Rep. Mexicana* **4** (1898): 5–30, 73–92. **Buelna.**

La Atlántida, estudio presentado por el Señor Lic. Eustaquio Buelna en el Congreso de Americanistas.

This paper deals with the uncertain legends of early geographical discovery, touching on the position of Ultima Thule, and treating in some detail of the lost Atlantis.

Historical—Bibliography. ——

Catalogue de la grande collection exquise de Livres imprimés et Manuscrits, Cartes, Portraits et Estampes provenant de M. W. J. Roijaards van den Ham. Deuxième partie. Histoire et Géographie, Généalogie, Héraldique, Numismatique. Utrecht: J. L. Beijers, 1899. Size 9 × 7, pp. viii. and 192.

Historical—Maps. *B.S.R.G. d'Anvers* **22** (1899): 220–242. **Fiorini.**

Periplus. Traduit par M. J. Mertens.

A translation by M. Jules Mertens of a communication by Prof. Matteo Fiorini to the Italian Geographical Society, on the subject of Baron Nordenskiöld's great work on ancient maps.

Historical—Sea Power. **Mahan.**

The Influence of Sea Power upon the French Revolution and Empire, 1793–1812. By Captain A. T. Mahan, D.C.L., LL.D. 2 vols. London: Low & Co. [1892]. Size 9 × 6½, pp. (vol. i.) xx. and 380; (vol. ii.) xviii. and 428. *Maps and Plans.*

BIOGRAPHY.

Aitchison. *P.R.S.* **64** (1899): xi.–xiii. ——

Brigade-Surgeon James Edward Tierney Aitchison, M.D., F.R.S., etc.

Bässler. *Globus* **75** (1899): 28–29. ——

Dr. Arthur Bässlers Reisen und Sammlungen. *With Portrait.*

Dr. Bässler has travelled over a great part of the world studying ethnography and collecting specimens.

Gsell-Fels. *Deutsche Rundschau G.* **21** (1899): 185–186. ——

Dr. Theodor Gsell-Fels. *With Portrait.*

Dr. Gsell-Fels, born in 1818, was a popular writer on geography and travel.

Honter. *M.G. Ges. Wien* **41** (1898): 643–663. **Günther.**

Johannes Honter, der Geograph Siebenbürgens. Von Prof. Dr. Siegmund Günther.

A biography of the nearly forgotten Transylvanian geographer Honter, who was born in 1498. A copy of his 'Cosmographia' has recently been acquired for the Library.

Liburnau. *Deutsche Rundschau G.* **21** (1899): 182–184. ——

Dr. J. R. Lorenz Ritter v. Liburnau. *With Portrait.*

Marche. *Deutsche Rundschau G.* **21** (1898): 135–136. ——

Alfred Marche. *With Portrait.*

M. Marche travelled extensively in West Africa, and by his explorations assisted in extending the French colonial empire.

Ruge. *XXVI. Jahresb. Ver. Erdk. Dresden* (1898): iii.–iv. ——

Sophus Ruge. *With Portrait.*

Prof. Ruge has completed the thirty-fifth year of his presidency of the Dresden Geographical Society.

Simony. **Penck.**

Frederick Simony. Leben und Wirken eines Alpenforschers. Ein Beitrag zur Geschichte der Geographie in Österreich von Dr. Albrecht Penck.—Geographische Abhandlungen. Herausgegeben von Prof. Dr. Albrecht Penck. Band vi., Heft 3. Wien: E. Hölzel, 1898. Size 11 × 7½, pp. 116. *Photographs, etc. Presented by the Author.*

Thoroddsen. *Deutsche Rundschau G.* **21** (1898): 133–135. ———

Dr. Thorvaldur Thoroddsen. *With Portrait.*

GENERAL.

British Empire. **Dilke**

The British Empire. By the Right Hon. Sir Charles W. Dilke, Bart., M.P. London: Chatto and Windus, 1899. Size 8 × 5½, pp. 160. *Price* 3*s.* 6*d. Presented by the Publishers.*

This little volume consists of a series of essays published in various periodicals by the author during 1898, and dealing with the political and economic conditions of the British Empire. The chapters touch on a bird's-eye view of the empire, India, the Dominion of Canada, Newfoundland, the Commonwealth of Australia, New Zealand, Africa, Crown Colonies, imperial defence, and a few hints on books, entitled "How to study the Empire."

British Empire. *Nineteenth Century* **45** (1899): 226–234. **Hurd.**

An All-British Cable System. By Archibald S. Hurd.

Educational—Methods. *J. School G.* **2** (1898): 321–328, 379–385. **Merrill.**

A Suggestive Course in Geography. By J. A. Merrill.

Exchanges. **Norman.**

The World's Exchanges in 1898. By John Henry Norman. London: Low & Co., 1898. Size 8½ × 5½, pp. 54. *Price* 1*s.* 6*d. Presented by the Author.*

Tables of the sterling value of foreign currencies.

Geographical Work in Austria. *M.G. Ges. Wien* **41** (1898): 717–738. ———

Bericht über die Leistungen österreichischer Staatsinstitute und Vereine auf geographischen und verwandten Gebieten im Jahre, 1897.

Geology and Engineering. *P.I. Civil Engineers* **134** (1898): 254–277. **Dawkins.**

On the Relation of Geology to Engineering. By Professor Boyd Dawkins, F.R.S. *With Illustrations.*

German Colonies. ———

Weissbuch. Neunzehnter Theil. Berlin: C. Heymann, 1899. Size 13 × 9½, pp. 218.

Annual reports and memoranda on the development of the various German possessions.

Minerals. **Fletcher.**

British Museum (Natural History). Mineral Department. An Introduction to the Study of Minerals, with a guide to the Mineral Gallery. By L. Fletcher. Printed by order of the Trustees, 1897. Size 8½ × 5½, pp. 124. *Plan. Presented by the Trustees of the British Museum.*

Museum Report. **Brigham.**

Occasional Papers of the Bernice Pauahi Bishop Museum of Polynesian Ethnology and Natural History. Vol. i.—No. 1, Director's Report. Honolulu: 1898. Size 9½ × 6, pp. vi. and 72. *Illustrations.*

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6-inch—County Maps:—

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Norway. **Norges Geografiske Opmaaling.**

1. Generalkart over det sydlige Norge i 18 Blade. Scale 1 : 400,000 or 6·2 stat. miles to an inch. Sheet xiii. 1896.—2. Topografisk kart over kongeriget Norge. Scale 1 : 100,000 or 1·6 stat. mile to an inch. Sheets: 4A, Flekkefjord; 27A, Vermunden; 27C, Sandkildfossen; K 16, Junkeren; L 15, Nasa; L 16, Virvand; L 17, Mosjöen; S 3, Loppen; T 2, Galten; T 3, Söröen; Y 4, Polmak.—3. Soudre Trondhjems Amt II. Scale 1 : 200,000 or 3·2 stat. miles to an inch. E sheet, Norges Geografiske Opmaaling, Kristiania. *Presented by the Geographical Institute of Norway.*

ASIA.

Shantung. **Hassenstein.**

Karte der Provinz Schan-Tung mit dem deutschen Pachtgebiet von Kiau-tschou. Hauptsächlich nach japanischen und chinesischen Quellen entworfen und gezeichnet von Dr. Bruno Hassenstein. Scale 1 : 650,000 or 10·2 stat. miles to an inch. Gotha: Justus Perthes, 1898. *Price* 4 *marks.*

This map of Shantung has been principally compiled from Chinese and Japanese sources. It contains a large amount of valuable information, both on the map itself and in the notes and letterpress which accompany it. The extent of the British and German concessions at Wei-hai-wei and Kiao-chau are shown, all roads, tracks, telegraph lines, and projected railways are laid down, and all systems of inland navigation are indicated.

AMERICA.

Nicaragua. **Sonnenstern.**

Official Map of Nicaragua. Compiled by order of His Excellency the President, General Don Jose Santos Zelaya, from Surveys by Maximiliano Sonnenstern, Govt. Civil Engineer, assisted by William P. Collins, G.C.E. Revised up to date, 1898. Published by H. G. Chalkley, Chicago. On rollers. *Price* $10.

This map is based on the surveys of Maximiliano Sonnenstern, and professes to have been revised to 1898, although the compiler does not appear to have made good use of

the map of North-Eastern Nicaragua, from a survey of Mr. J. M. Nicol, C.E., 1897, which was published in the *Geographical Journal*, June, 1898.

In addition to the general map, there are sections of the proposed Nicaragua inter-oceanic canal, and inset plans of the ports of Corinto, San Juan del Norte, and San Juan del Sur.

AUSTRALIA.

Northampton, Western Australia. **Maitland.**

Geological Map of Northampton, Western Australia. Scale 1 : 15,840 or 0·25 mile to an inch. A. Gibb Maitland, Govt. Geologist, 1898. Geological Survey of Western Australia. 2 sheets. *Presented by the Author.*

The topography of this map is drawn from a plane-table survey by S. J. Becher, on which the geological formations are shown by Mr. A. Gibb Maitland. The hill-work is shown by contour-lines, and an index is given of the colours and signs employed.

Sydney. **Robinson.**

Map of the City of Sydney and adjacent suburbs. Lithographed and published by H. E. C. Robinson, Sydney, N.S.W. Scale 660 feet to an inch. *Presented by the Publisher.*

This map is clearly drawn and printed in colours. Soundings in feet are given, and the city and municipal boundaries are laid down.

CHARTS.

British Columbia and Alaska. **Jenkins.**

British Columbia and Alaska from Victoria to Bering Sea. Scale 1 : 3,636,864 or 57·4 stat. miles to an inch. H. D. Jenkins, F.R.G.S. Published by James Imray & Sons, London, 1899. *Presented by the Publishers.*

Norwegian Charts. **Norges Geografiske Opmaaling.**

1. Specialkart over den Norske Kyst fra Strömöerne til Tjötta. Scale 1 : 50,000. 1898.—2. Specialkart over den Norske Kyst Vefsen og Leirfjorden. Scale 1 : 50,000. 1898.—3. Specialkart over den Norske Kyst fra Hitteren til Kraakvaagö og fröien. Scale 1 : 50,000. 1896.—4. Specialkart over Trondhjemsfjorden. Scale 1 : 100,000. 1898.—5. Specialkart over Trondhjemsfjorden. Scale 1 : 100,000. 1898. Norges Geografiske Opmaaling, Khristiania. *Presented by the Geographical Institute of Norway.*

United States Charts. **U.S. Hydrographic Office.**

Pilot Chart of the North Pacific Ocean for March, 1899. Published at the Hydrographic Office, Washington, D.C. *Presented by the U.S. Hydrographic Office.*

PHOTOGRAPHS.

Transvaal and Natal. **Melvill.**

Seventeen Photographs of the Transvaal and Natal, by E. H. V. Melvill, A.M.I.C.E., Government Surveyor. *Presented by E. H. V. Melvill, Esq.*

This series of photographs represents scenery and natives of Natal and the Transvaal. The following are their titles:—

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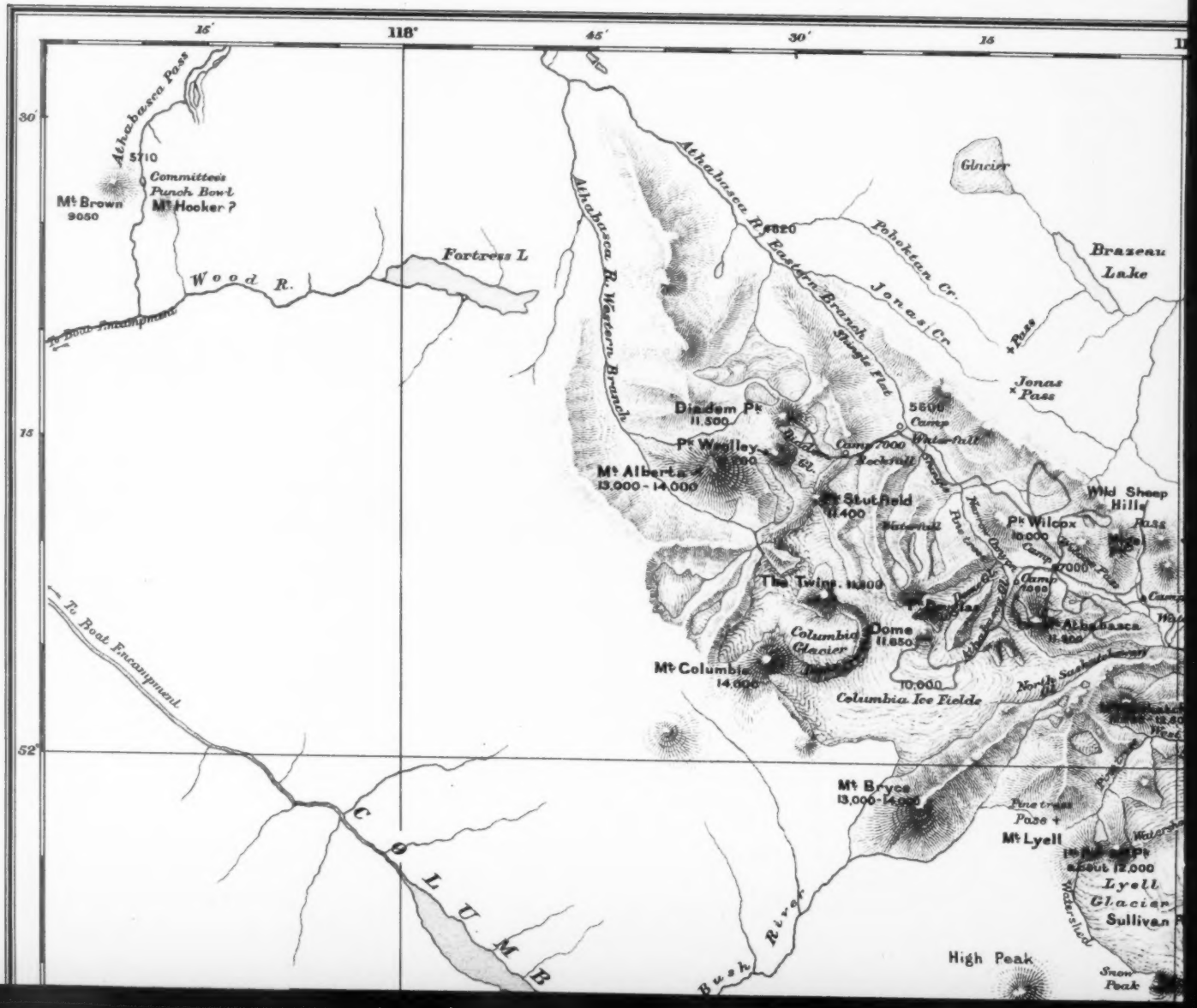
N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.


15'
118°
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Athabasca Pass
5710
Committee's Punch Bowl
Mt Brown
9050
Mt Hooker ?
Wood R.
Fortress L
To Boat Encampment
Athabasca R. Western Branch
Athabasca R. Eastern Branch
Shingle Flat
Poboktan Cr.
Jonas Cr.
Pass
Jonas Pass
Glacier
Brazeau Lake
Diadem Pk
11,500
Pk Wesley
Mt Alberta
13,000 - 14,000
5800
Camp
Camp 7000
Rockwall
Waterfall
Mt Stutfield
11,400
Wild Sheep Hills
Pass
Pk Wilcox
10,000
Camp
7000 Pass
The Twins, 11,300
Douglas
Mt Athabasca
11,400
Columbia Dome
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Columbia Glacier
Mt Columbia
14,000
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Columbia Ice Fields
North Saskatchewan
To Boat Encampment
COLUMB
Mt Bryce
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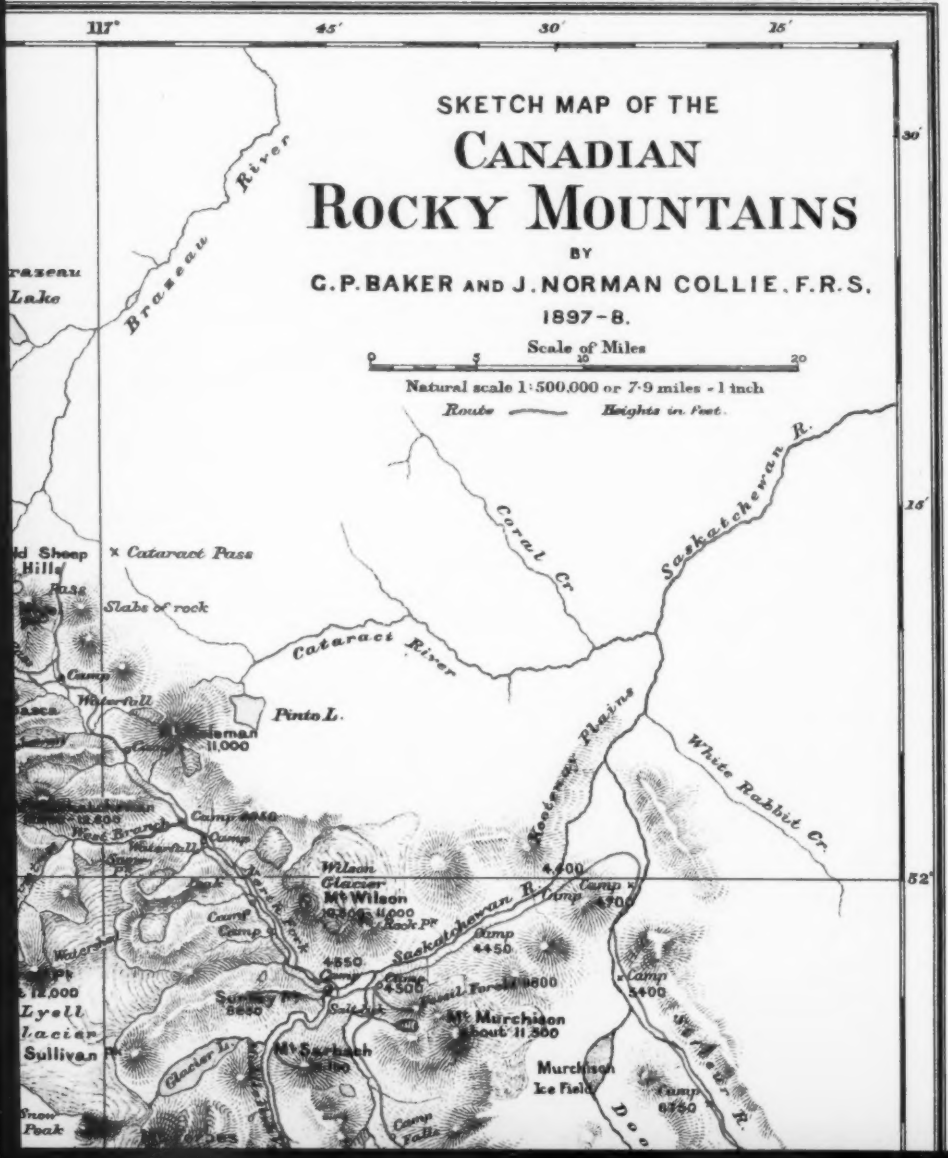
Sullivan
Watershed
Bush River
High Peak
Snow Peak


117°
45'
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52'
SKETCH MAP OF THE
CANADIAN
ROCKY MOUNTAINS
BY
C. P. BAKER AND J. NORMAN COLLIE, F.R.S.
1897-8.
Scale of Miles
0 5 10 20
Natural scale 1:500,000 or 7·9 miles = 1 inch
Route
Heights in Feet.
Brazeau River
Brazeau Lake
Coral Cr
Saskatchewan R.
Cataract Pass
Slabs of rock
Cataract River
Pinto L.
Camp
Waterfall
Camp 4950
Camp
Wilson Glacier
Mt Wilson
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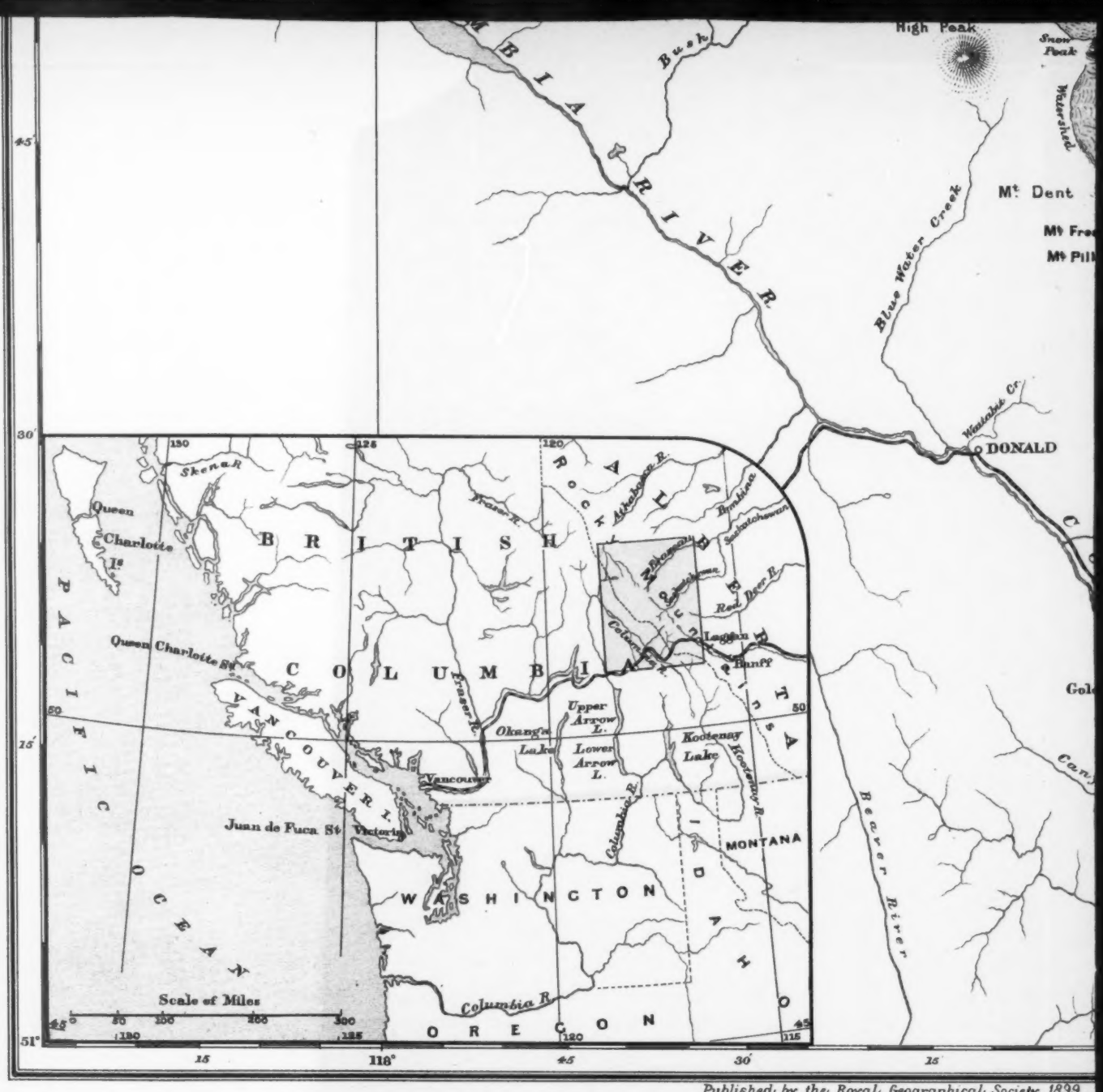
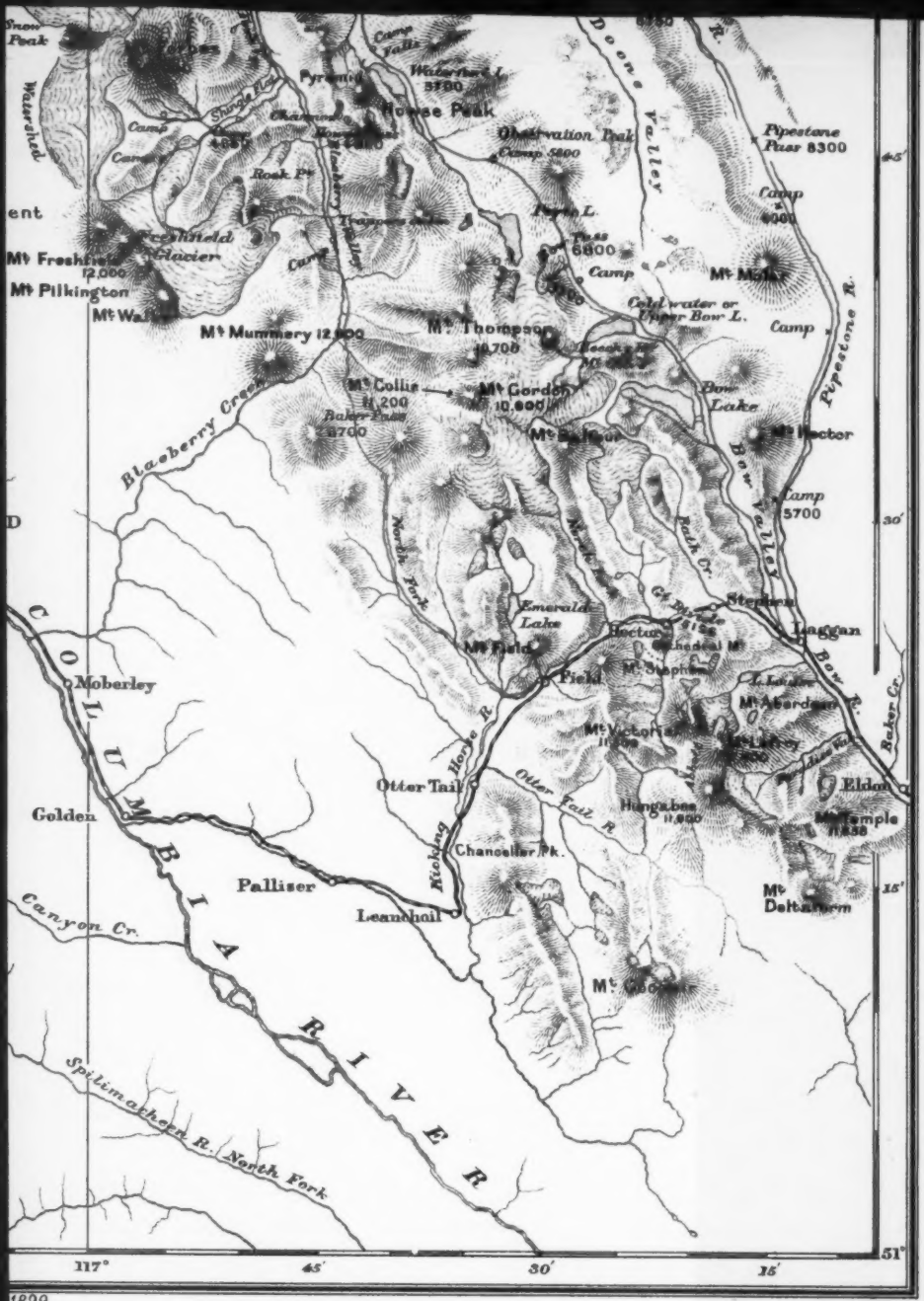
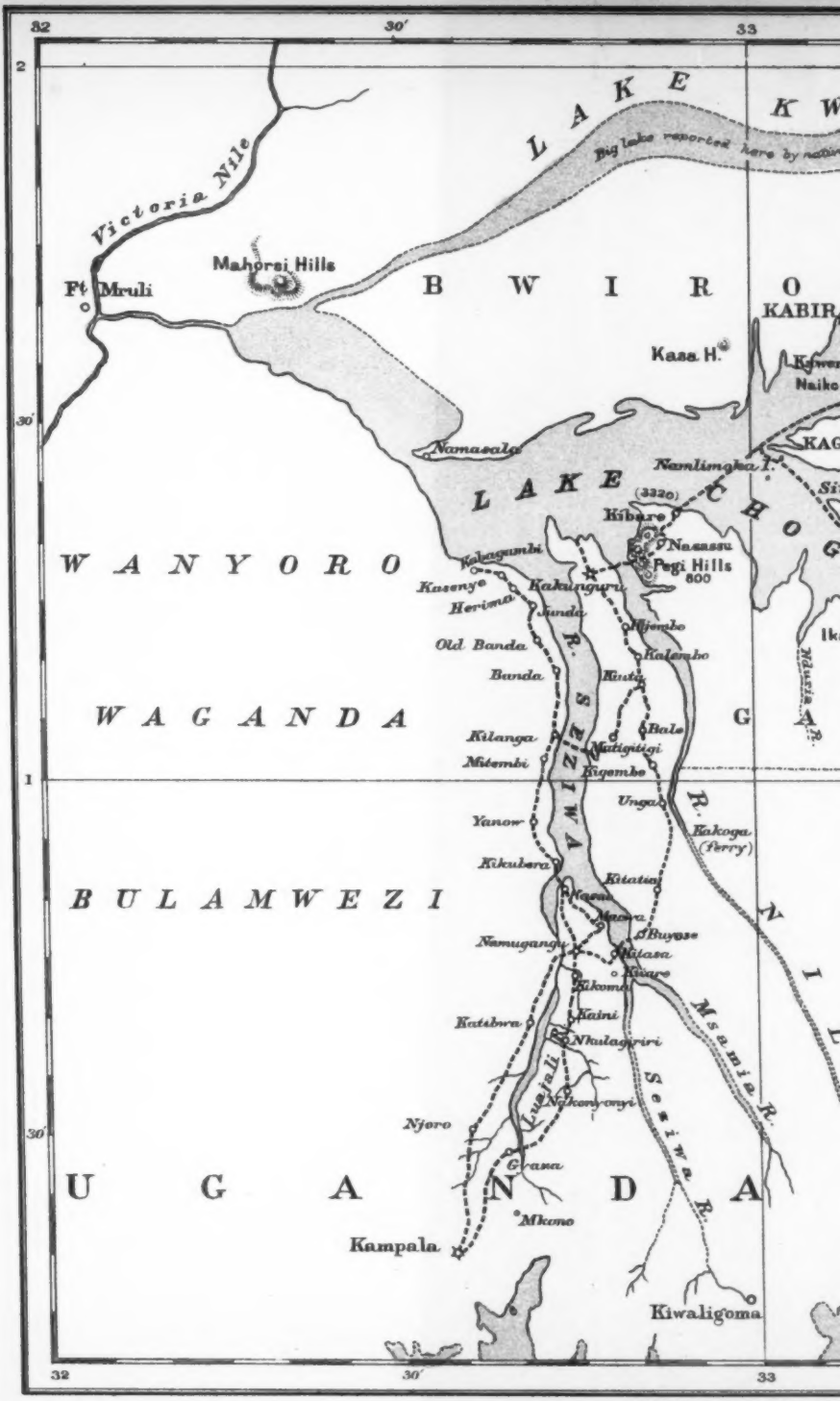
Camp
4700
Camp
Camp
Camp
Mt Murchison
about 11,500
Mt Sarbach
Glacier L.
Murchison Ice Field
Camp
6750
Camp
Falls
Snow Peak
Lyell
Sullivan
Rocky Mountain Plains
White Rabbit Cr.
Mt Maud R.

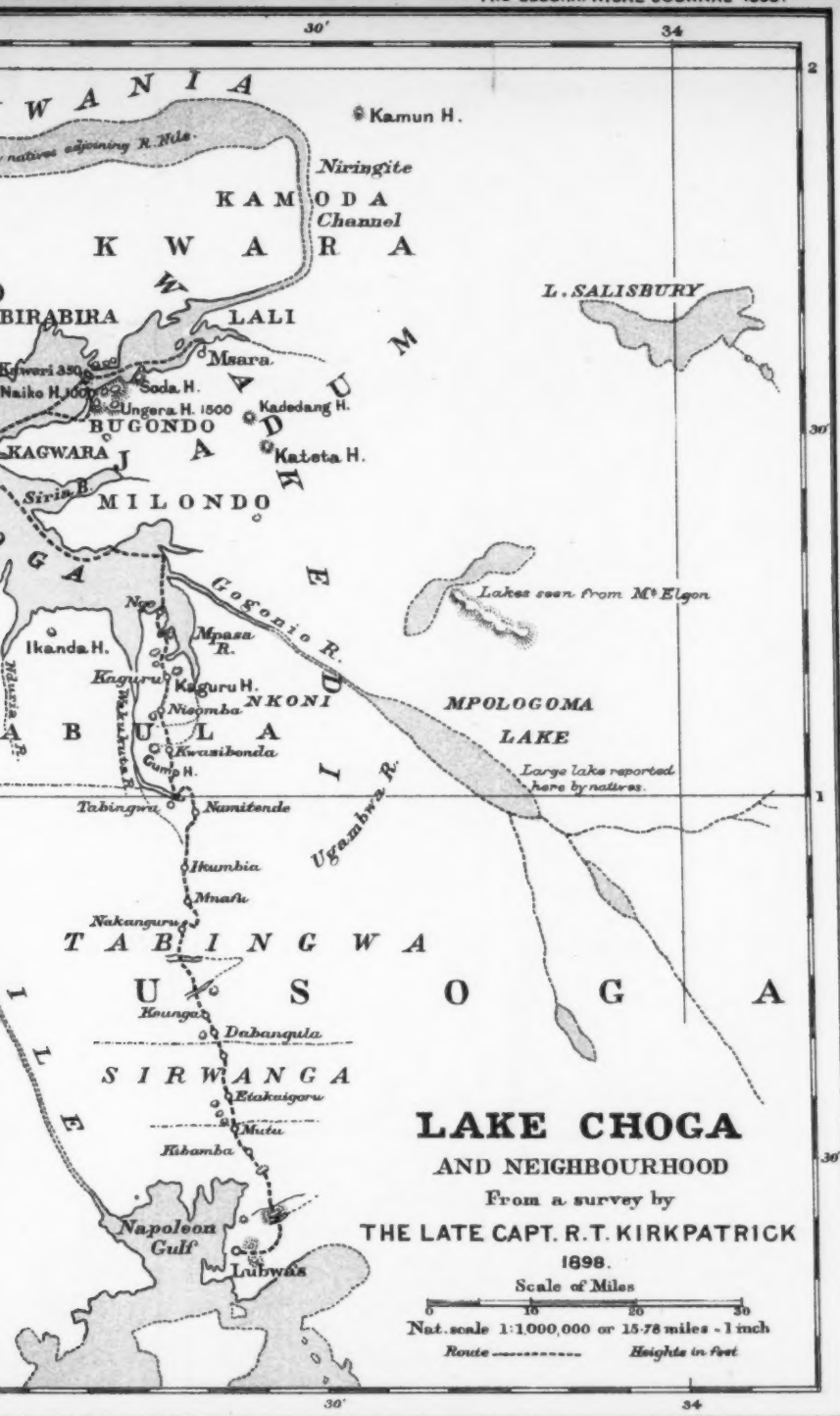


Published by the Royal Geographical Society, 1839.


Snow Peak
Watershed
Camp Valley
Pyramid
Waterfront L. 5780
Howse Peak
Observation Peak Camp 5800
Doorne Valley
Pipestone Pass 8300
Camp 6000
Mt Freshfield 12,000
Freshfield Glacier
Mt Pilkington
Mt Wa...
Taylor L.
Tent 6800
Camp
Mt Mackay
Cold water or Upper Bow L.
Camp
Mt Mummery 12,000
Mt Thompson 10,700
Mt Collie 11,200
Mt Gordon 10,800
Baker Pass 8700
Blaeberry Creek
Bow Lake
Mt Hector
Pipestone R.
Bow Valley
Camp 5700
North Fork
South Cr.
Emerald Lake
Mt Field
Hector
Cathedral Mt
Stephen
Laggan
Bow R.
Baker Cr.
Moberley
Field
Mt Stephen
L. Louise
Mt Aberdeen
Mt Victoria 11,300
Mt Lefroy 11,230
Eldon
Otter Tail
Otter Tail R.
Hungabee 11,900
Mt Temple 11,636
Golden
Chancellor Pk.
Palliser
Leanchoil
Mt Deltaform
Canyon Cr.
COLUMBIA RIVER
Spillimacheen R. North Fork
117°
45'
30'
15'
51°
45'
30'
15'

1899.


32
30'
33
2
1
30'
LAKE
Big lake reported here by natives
Victoria Nile
Mahorsi Hills
Ft Mruli
B W I R O
KABIR
Kasa H.
Namasala
Nanlimgha I.
LAKE
(3320)
Kibaro
Nasassu
Pegi Hills
800
W A N Y O R O
Kalagumbi
Kasenye
Herima
Kakangaru
Junda
Mjembo
Old Banda
Kalerabo
Banda
Kinta
W A G A N D A
Kilanga
Mitombi
Bale
Matigitigi
Kigombo
Unga
Yanow
Kakoga (Perry)
Kikulera
Kitatisa
B U L A M W E Z I
Kasai
Masaka
Namugangi
Buyasse
Kitara
Kikoma
Kiwaro
Katibwa
Kaini
Ntulagiriri
Nakanyonyi
Njoro
Grana
U G A N D A
Mkono
Kampala
Kiwaligoma
Published by the Royal


30'
34
2
1
30'
W A N I A
natives adjoining R. Nile
Kamun H.
Niringite
KAMODA
Channel
K W A R A
W A D U M
BIRABIRA
LALI
L. SALISBURY
Msara
Soda H.
Ungera H. 1500
Kadedang H.
BUGONDO
KAGWARA
J A D K
Kateta H.
Siria R.
MILONDO
G A
E E
Lakes seen from Mt Elgon
Gogonio R.
Mpasa R.
Ikanda H.
Kaguru H.
Nsomba
NKONI
MPOLOGOMA
LAKE
A B U L A
I D
Kwasibonda Camp H.
Large lake reported here by natives.
Tabingwa
Namitende
Ugambwa R.
Ikumbia
Mnafu
Nakangurus
T A B I N G W A
U S O G A
Kounga
Dabangula
S I R W A N G A
Etakaigoru
Mutu
Kibamba
I L E
Napoleon Gulf
Lubwas
LAKE CHOGA
AND NEIGHBOURHOOD
From a survey by
THE LATE CAPT. R.T. KIRKPATRICK
1898.
Scale of Miles
0 10 20 30
Nat. scale 1:1,000,000 or 15·78 miles = 1 inch
Route
Heights in feet